DOCUMENT RESUME

ED 437 985 JC 000 118

AUTHOR Boettcher, Judith; Conrad, Rita-Marie
TITLE Faculty Guide for Moving Teaching and Learning to the Web.
INSTITUTION League for Innovation in the Community Coll., Laguna Hills, CA.
PUB DATE 1999-00-00
NOTE 132p.; Support for the production of this publication provided by the Corporation for Research and Educational Networking (CREN).
PUB TYPE Guides - Classroom - Teacher (052) -- Reports - Descriptive (141)
EDRS PRICE MF01/PC06 Plus Postage.
DESCRIPTORS *College Faculty; Community Colleges; *Computer Uses in Education; Curriculum Development; Distance Education; *Educational Technology; Higher Education; *World Wide Web
IDENTIFIERS *Technology Utilization

ABSTRACT

This book serves as a guide for faculty in using computers, the Internet and the World Wide Web as instructional tools in higher education. Chapter 1, "Introduction to the Internet and the Web for Higher Education", provides a brief history of the Internet and builds conceptual understanding of the Internet and its usefulness in education. Chapter 2, "Principles of Technology and Change to Guide our Journey to the Web," discusses principles behind technology innovation and provides key statistics. Chapter 3, "What We Know about Teaching and Learning," introduces the emerging educational environment on the Web. Chapter 4, "Envisioning, Planning and Identifying Resources," addresses general topics for faculty moving courses to the Web. Chapter 5, "Instructional Design Guidelines for Moving Courses to the Web," provides guidelines for initial course design. Chapter 6, "Steps in Developing Web Courses," presents a step-by-step process for course development. Chapter 7, "Tools and Resources for Creating Web Courses," describes five phases for moving a course to the Web. Chapter 8, "Web Course Models," provides several examples of Web courses. Chapter 9, "Creating and Sustaining Online Communities," discusses strategies for a collaborative learning environment. Chapter 10, "Issues in the Web Environment," focuses on four issues relevant to instructors. Finally, Chapter 11 provides perspectives on the future. Contains over 40 references. (RDG)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 437 985

FACULTY GUIDE FOR MOVING TEACHING AND LEARNING TO THE WEB

PERMISSION TO REPRODUCE AND
DISSEMINATE THIS MATERIAL HAS
BEEN GRANTED BY

D. Doucette

TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC)

1

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)
☒ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
● Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Judith V. Boettcher,
Corporation for Research and Educational Networking

Rita-Marie Conrad,
Florida State University

JC 000118

League for Innovation in the Community College
1999

BEST COPY AVAILABLE

This monograph is published by the League for Innovation in the Community College as part of its Information Technology Initiative. The League wishes to acknowledge the support of the Corporation for Research and Educational Networking (CREN) in the production of this publication. Descriptions of and contact information for CREN and the League are available at the back of this document. Additional copies of this monograph may be ordered from the League for Innovation through the League's online bookstore available at www.league.org. For other ordering options, please phone 1-949-367-2884.

FACULTY GUIDE FOR MOVING TEACHING AND LEARNING TO THE WEB

Judith V. Boettcher,
Corporation for Research and Educational Networking

Rita-Marie Conrad,
Florida State University

League for Innovation in the Community College
1999

FACULTY GUIDE FOR MOVING TEACHING AND LEARNING TO THE WEB

TABLE OF CONTENTS

Foreword, Carl Berger, University of Michigan i

Acknowledgments iii

Introduction v

Chapter 1: An Introduction to the Internet and the Web for Higher Education 1

Chapter 2: Principles of Technology and Change to Guide Our Journey to the Web 7

Chapter 3: What We Know About Teaching and Learning 15

Chapter 4: Envisioning, Planning, and Identifying Resources 23

Chapter 5: Instructional Design Guidelines for Moving Courses to the Web 35

Chapter 6: Steps in Developing Web Courses 47

Chapter 7: Tools and Resources for Creating Web Courses 59

Chapter 8: Web Course Models 71

Chapter 9: Creating and Sustaining Online Communities 87

Chapter 10: Issues in the Web Environment 95

Chapter 11: Perspectives on the Future 109

Resources 120

About the Authors 123

About the Corporation for Research and Educational Networking (CREN) 124

FOREWORD

How do you write a book about technology when technology is changing rapidly? How do you write a book about education when new ideas of teaching and learning are emerging yearly? And how do you write a book that combines the latest in learning and teaching with the latest in technology and keep *both* timeless? Boettcher and Conrad have done just that . . . but how?

In reality this text could have been written about teaching and learning using "the book," or using "the radio," or using "the TV," or using "the overhead projector." Then again it could not. In reality this text could have been written about using technology in "drill and practice," "programmed learning," "collaborative education," or "constructivism." Yet again, it could not.

The reason *that* text could not have been written is that the result would be time-bound, and worse, domain-bound. The book not written would have been time-bound in that technology changes rapidly and the use of technology, be it the book or the Web, reflects not only the desire of educators to use the latest technology, but also a very real change in working and thinking in our society. Educators are constantly asked if new technology really makes a difference in learning and teaching and they are constantly asked for tight, definitive studies to show that it is so. At the same time, our society has moved rapidly with the technology such that it now permeates our very economic and social fiber. It would be as if educators were asked to justify having books for students after the society had become literate though reading. Thus, this text could not be written about even the most current or most imagined technology alone.

The reason *that* text could not have been written is that it would be learning and teaching bound. If there is one thing that we have learned in the last few years in educational and psychological understanding, it is that teaching and learning can be done in many ways and from many domains, and that learning is a *creative endeavor by the learner*. Educators are asked constantly for the best way to teach and learn as if there is really one right answer. At the same time our society is gaining knowledge, having experiences, and building attitudes (in other words, learning) from a wide variety of technologies and domains. Again, we can't match the teaching style to the learner as we are constantly learning with a variety of teaching styles from the very multiple technologies we live within. Thus, this text could not be written about the most current or the most imagined teaching and learning theories alone.

What we now have, and what Boettcher and Conrad use throughout this work, is the interplay of technological concepts with teaching and learning. They work with strong, cogent ideas such as the Zone of Proximal Development and the understanding that learning progresses in broad stages with overlaps and regressions. Using the Web as a true breakthrough in interactive presentation, response, collaboration, and involvement, the authors have developed a "holodeck" where new teaching and new technology will easily fit the fabric of several time domains. It is no coincidence that the authors use the holodeck as an analogue. The holodeck provides timeless ideas to be tested in new and unusual surroundings. The holodeck allows ideas to be tried and tested with opportunities for graceful failures as well as successes. The holodeck allows scenarios to be tested that are real and fanciful.

In a real way, you are about to use this text as your holodeck on a teaching and learning journey. You are about to embark on such a journey in your teaching and learning where you will be faced with a constantly changing environment. This text can help provide the navigational tools, a new understanding of your own teaching and learning environment; it can help provide you with that adventuresome spirit that moving into the unknown brings. Best yet, the authors are providing you with the grounding of the great ideas of technology and the great ideas of teaching and learning. You will discover multiple interactive pathways though constantly expanding education worlds. I wish you an exciting and challenging journey.

Carl Berger

Carl Berger is Professor of Science and Technology Education at the University of Michigan where he also serves as Director and Academic Liaison in the Office of the Chief Information Officer of the University. A graduate of the University of California, Berkeley, he has written over 25 books and holds two patents on science teaching and learning. The former Dean of Education at the University of Michigan, he has researched for over 20 years how learners have used technology to increase their knowledge, experience, and confidence. He recently received the Distinguished Contribution in Research award by the National Association for Research in Science Teaching.

ACKNOWLEDGMENTS

This book is the coming together of a serendipitous set of people, ideas, and events over a period of almost ten years. However, the particular catalyst event behind this book was a three-day tour across northern Wisconsin in May 1998. On that road tour, Terry O'Banion and Judith had time to brainstorm and think about a book that might be a guide to faculty about the use of the Web in teaching and learning. We knew that some faculty approached the use of the Web in teaching and learning with bravado, genius, and enthusiasm. We knew that other faculty were curious about the Web, but much too busy and engrained in old habits. Still other faculty preferred not to approach the Web at all, but to leave it for others, please!

So an important acknowledgment goes to Terry for his encouragement to build a guide that would explain, encourage, and suggest ways for faculty to embrace the Web joyfully for teaching and learning.

There are a host of others we also acknowledge. We thank our editors, in particular Cynthia Wilson, for the awesome task of editing the book, and Cindy Miles and Ann Doty of the League office who supported us over the longer writing time. The guide is longer than we expected and, with everyone's help and patience, much better!

Also, we acknowledge the faculty and students at our current and former institutions. In our associations with these organizations, we have enjoyed learning and experimenting with effective uses of the Web. We acknowledge and thank our colleagues at Penn State University and Florida State University, as well as all our friends and colleagues in the instructional technology profession and all the staff and volunteers associated with CREN, the nonprofit higher education association. The interactions, discussions, and brainstorming sessions helped to inform and shape the ideas in this book.

We also recognize the contributions of the faculty and information technology staffers who attended various versions of the online and distance learning workshops offered through *Syllabus*, the readers of the *Syllabus* distance learning columns, and especially the faculty who contributed their stories to the chapter on models of Web courses. These interactions helped crystallize the real-life campus questions and strategies faced by faculty, staff, and students.

Finally, we acknowledge our husbands, Gil and Larry, for their patience and support while this book was being written. Writing and rewriting took precedence over cooking, sailing, traveling, and deck time. To all, thanks!

Judith V. Boettcher, CREN
Rita-Marie Conrad, Florida State University

INTRODUCTION

We believe that it is absolutely essential for higher education institutions to fully integrate the Web into fulfilling their missions of teaching, learning, and research. To continue our work without using this powerful new tool would be to turn our backs on technology that enables us to create teaching and learning environments that are more interactive and collaborative than any that have been possible before.

Our higher education institutions are in the knowledge business. We create knowledge, we analyze and manipulate knowledge, we organize knowledge, we share knowledge, and we help others acquire and use knowledge. Computers, the Internet, and the World Wide Web are the most powerful information and knowledge tools now available. As educators, we use the core processes of communication and interaction with each other in teaching and learning. The new knowledge tools support these core processes with faster, more personal, more flexible communication than we have ever had. We offer the eleven chapters of this text as both a guide for applying these new tools and as evidence that we are living in a tremendously exciting time in education.

1. An Introduction to the Internet and the Web for Higher Education

We begin the book with a brief history of the Internet from its beginnings in 1966 as a tool to support the sharing of scarce computer resources among scientists across the country. The power of the Internet to support communications came later. It is these communications applications that support the core processes of teaching and learning.

In this chapter, we also describe the basics of how the Internet works, how the Web developed, and how fast the use of the Internet and the Web have developed over Net Time. The chapter helps build a conceptual understanding of the Internet and the Web infrastructure and clarify its usefulness for teaching and learning. These concepts are fundamental to knowing how to plan for the support and offering of courses on the Web.

2. Principles of Technology and Change to Guide Our Journey to the Web

The second chapter includes a discussion of the principles behind the technology innovation adoption curve and the change processes that accompany the adoption of technology innovations. These principles highlight the need for campus policies that support successful adoption of new technology by faculty, staff, and students.

This chapter also provides some key statistics and trend lines about the adoption of technology innovations. Some of these statistics include factors important to teaching and learning programs, such as personal computer ownership by faculty and students and campus strategies for addressing technology needs and support.

3. What We Know About Teaching and Learning

In the third chapter, we introduce the newly emerging teaching and learning environment on the Web. This is the first truly major shift in instruction that has occurred in the last 500 years. It is the shift from the classroom as the primary center of organized instruction to the Web as the primary center of instruction.

This chapter provides background in the pedagogy of instruction, including an examination of how the basics of the teaching and learning processes are really communications and dialogue processes. The fundamental ideas of five educational theorists provide support for rethinking the core processes of teaching and learning. When an environment is changed, it is wise to reexamine the core assumptions of the earlier model. New environments often enable us to solve longstanding problems easily and affordably.

4. Envisioning, Planning and Identifying Resources

With this chapter, we begin the how-to section of the book. The first part of this chapter addresses questions of focus: How does one choose what courses should be offered on the Web? How does a faculty member prepare for moving courses to the Web? What types of tools and resources are needed? What type of design and development time is needed? What infrastructure needs to be in place?

Three different types of Web courses–WebCourse, WebCentric, and WebEnhanced–are described in this chapter. A discussion of WebPresence, an information format similar to an entry in a course catalog, is also included. Descriptions of two decision layers will help educators determine the focus of a Web course project and the types of resources, support, and infrastructure that may be needed. Two worksheets included in the chapter are based on the two decision layers and are designed to help faculty move courses to the Web.

5. Instructional Design Guidelines for Moving Courses to the Web

This chapter is the design chapter of the book. If a faculty member is going to design a course for the Web, what will it look like? How will it be similar to a traditional on-campus course? How will it differ from a traditional on-campus course? What will it have in common with distance learning courses? How will it differ from traditional distance learning courses?

In this chapter, we analyze the structure of traditional courses, focusing on the three-credit course model. We describe the expectations for time and workload on the part of faculty and students, and ask what the expected instructional and learning outcomes will look like, given these expectations.

Finally, a major section of the chapter is devoted to the process of instructional design. This section contains a list of ten simple guidelines for designing and developing courses that we envision as "An Instructional Designer in a Box."

6. Steps in Developing Web Courses

This chapter presents a step-by-step process for developing Web courses. For all practical purposes, the design and development of courses today is a cottage industry. Faculty members design, redesign, update, and change their courses every semester. No course is quite like any other. This is both the challenge and the drawback of our current models.

In this chapter, we look at the kinds of expertise needed to design and develop the course materials that "fill" or make up the digital content for teaching and learning in an online classroom. This chapter also features a process of eight steps for systematically designing and developing a Web course.

7. Tools and Resources for Creating Web Courses

This section describes the five phases in the design and development of moving a course to the Web:

- Define the goals and objectives
- Search for content materials
- Reexamine course goals and define course units and evaluation processes
- Gather and digitize course materials and develop course units
- Deliver, test, and evaluate

8. Web Course Models

In this chapter, we provide several examples of the three types of Web course models: WebCourse, WebCentric, and WebEnhanced. This chapter features examples of these courses from faculty themselves. In this chapter, we also describe different designs for courses according to the amount of prepackaged content, dynamic content, and time used for different types of dialogues, such as large group synchronous activities, small group activities, and individual dialogue with resources.

9. Creating and Sustaining Online Communities

Distance education originally meant that the learner was isolated, not only from the instructor but from other learners as well. Today's technology tools are interactive and enable students to collaborate more actively in the teaching and learning processes. This chapter defines collaborative learning and discusses strategies for creating a collaborative learning environment. The chapter also focuses on the development of learning communities in distance courses.

10. Issues in the Web Environment

This chapter is a "filling in some of the cracks for a while" chapter. In it, we focus on four issues educators never seem to have enough time to explore in depth. Our discussion serves as a starting point for discussion and a snapshot of the four issues:

- Managing e-mail communication with students
- Class size in online courses
- Copyright issues and intellectual property policies
- Assessment and evaluation

11. Perspectives on the Future

Where will we be in teaching and learning in higher education in the year 2007? This chapter provides a glimpse into what the higher education enterprise might feature just a few short years from now.

The predictions are organized around six different components of higher education: (1) the higher education enterprise as a whole; (2) degree programs and continuing education programs; (3) the institutional infrastructure; (4) faculty and student tools and roles; (5) content resources; and (6) research in learning.

The second part of the chapter is a science fiction fantasy about what learning might be beyond the year 2007. "Student-Centered Learning in the Lasting Experiences Ltd. Holodeck: As Good as It Gets!" was first published as a column in *Syllabus* in June 1998. Enjoy!

CHAPTER 1
AN INTRODUCTION TO THE INTERNET AND THE WEB FOR HIGHER EDUCATION

Overview

This chapter provides a brief history of the Internet from its beginnings in the mid-1960s, when scientists began searching for ways to access remote computers and to share scarce computer resources. The power of the Internet to support e-mail and other types of communication was a serendipitous outcome of these efforts.

This chapter helps explain the Internet's importance, development, and infrastructure. Understanding the components of the network and how they fit together can also help us plan for the resources we need to support teaching and learning, whether on or off campus.

Where You Were When the Web Happened?

During the last decade, the global village that Marshall McLuhan envisioned may have arrived. In the 30-plus years since he said, "We now live in a global village . . . simultaneous happening," we have seen the gradual accumulation of invention upon invention. Then, with one critical development, the world truly shifted to a different place. In fact, it feels very much like that "global village . . . simultaneous happening" or the "allatonceness" described by McLuhan (1967, p. 63.) The critical development behind this shift is, of course, the World Wide Web, and most of us know that the infrastructure that makes the Web application possible is the global Internet.

Those of us who are old enough can remember where we were when we first heard the news that JFK was shot. Many of us also remember where we were when we first heard that Princess Diana had died. However, most of us do *not* remember where we were when the Web came to be. The Web did not happen as a single shocking event in time–at 10:30 on a Sunday morning, for example–but some of us are beginning to speak in terms of "before the Web" and "now that the Web is here." We are only beginning to realize all that we can do with this technology.

In a recent interview, Robert W. Lucky, a telecommunications leader at Bellcore, said, "It is easy to predict the future; what is hard is predicting what people will do with the technology" (1998, p. 72). He also commented that, "the Web is an astounding example of the lack of foresight. Nobody saw this–in industry or anywhere else. In retrospect, the Web is the most obvious thing you ever heard of, and it is such a world-class idea" (1998, p. 74).

In 1995, another leading industry giant, Bill Gates of Microsoft, released *The Road Ahead*. A new version of this book appeared in bookstores in 1996 with a bright sticker indicating that it had been updated to include the Internet and the Web. If Bill Gates didn't foresee the impact of the Web as late as 1995, how could we expect that the rest of us would?

Even if those most knowledgeable could not see the Web coming, the Web is now acknowledged as the cause of a fundamental shift in how people interact with other people and with organizations. In early 1998, it was estimated that over 120 million people worldwide were using the Internet, mostly for communication. In higher education, many faculty are adapting their teaching and learning activities to take advantage of the Web's communication capabilities. We believe that the Web supports the first truly innovative environments for teaching and learning since the introduction of books into the classroom.

The Web and Higher Education

The Web and the Internet continue to evolve rapidly and in unexpected ways. Many educators are developing an attitude of greater openness and flexibility toward this new technology. Occasionally, however, we hear the comment from our friends, colleagues, department chairs, and deans that we may want to wait for the technology to "settle down." As attractive as this choice may be, we believe that a better approach is to determine which core functions and capabilities of the Web are most useful for education. Then we can embrace the Internet and the Web technology that best support and extend the goals of the teaching and learning profession.

New technology can help higher education achieve goals that stem from pressures to become more efficient, to reduce costs, and to be more responsive. These pressures are increasing at the same time that our information-based economy is demanding the continual update and education of its workers. An analysis by Dolence and Norris (1995, p. 7) suggests that all workers should be spending up to 11 percent of their time learning. This means that we all need to be incorporating learning into our lives. We already see ourselves learning at work, at home, at the steering wheel, and at meals. We are also learning in short bursts and over extended periods of time. We are learning anywhere, anytime–just like our students!

What Is the Internet?

Although the Internet and the Web are now household words, for some people they remain a mystery. Simply stated, the Internet is a "network of networks." Before the development of a common language for all computers, communication between or among computers was difficult and, at times, impossible. In 1982, the development of a common computer network language, TCP/IP, enabled the loose collections of computers on local networks to be linked together in a gradual expansion of local, national, and global networks of computers. The formal definition, according to the Internet Society, is "a global network of networks enabling computers of all kinds to directly and transparently communicate and share services throughout much of the world."

A network's design, operation, and traffic volume determine the number and variety of network paths along which data messages travel. In fact, a data message might be divided into a set of smaller packets that travel on different paths across the network and then are reassembled before arriving at a mail server or at a personal computer. This helps explain why even though the network is very fast, it is not instantaneous and not 100 percent reliable. Data can get lost, which means that messages can get lost. The longstanding student excuse, "My dog ate my homework," could soon become, "But I sent it in. I don't know why it isn't there." And the student may be right!

The Origins of the Internet

The beginnings of the Internet can be traced to a small government agency, the Advanced Research Project Agency (ARPA), that supervised and directed funding of computer research in the early 1960s. This agency supported a cadre of computer scientists located at research universities across the United States. These scientists quickly developed a number of different computers, each with its own operating system, command language, and way to send data from point to point. These computers were expensive to design and build, and difficult and costly to use. The scientists, in an effort to be more productive, began searching for ways to communicate with each other via these systems and to share the resources of the scarce and expensive computers.

In 1962, as the programs funded by ARPA were beginning to expand their focus beyond the calculating abilities of the computers, a new division manager, J.C.R. Licklider, joined ARPA. Unlike many of the computer scientists working in the agency, Licklider was a psychologist who had migrated to the field of computing. Bringing a new perspective to the agency, he was particularly interested in interactive computing. He envisioned the computer as a tool that would be able to "act as an extension of the whole human being" and to "amplify the range of human intelligence" (Hafner & Lyon, 1998, p. 27).

Licklider's vision encouraged the concurrent development of interactive computing, number crunching computing, and network computing. Our use of the Internet and the Web in teaching and learning is, in many ways, a realization of his early vision.

The Growth of the Developing Internet

Once scientists developed the ability for computers to talk to one another, e-mail quickly became its most popular application; however, the cost and complexity of computers caused early growth to be slow. In 1971, ARPANET had 23 hosts connecting universities and research centers; a decade later, ARPANET had expanded to 213 hosts, and new hosts were being added at a rate of approximately one every 20 days.

Increased use of the Internet came with the introduction of personal computers in the mid-1980s. By 1987, the number of host computers linked to the Net had grown to over 10,000; by 1990, the number had reached over 300,000. Between 1990 and 1994, the traffic on most university networks doubled every year; today, doubling times are measured in months.

The driving force behind this growth was e-mail, known as a "killer application." A killer application is one whose benefits are so powerful that people will purchase computers, software, and network access just for the ability to use it. E-mail and communication services are major contributors to the explosive growth of the network, while electronic commerce (e-commerce) has an increasingly prominent presence as well.

In the late 1980s and early 1990s, the Internet was only user-friendly for the professionals in computer science, engineering, and other technical fields. It was less hospitable for nontechnical users, such as faculty members, staff, and students. We didn't know it at the time, but we needed the Web.

The Origins of the Web

At the European Laboratory for Particle Physics in Switzerland, a young physicist, Tim Berners-Lee, helped launch the phenomenon of the World Wide Web as "shared information space through which people (and machines) could communicate." In 1990, Berners-Lee created the first version of this "shared information space" by developing an enhanced protocol, HyperText Transfer Protocol (http), for sending information over the Internet. This protocol made "point and click" navigation available on the Internet, moving to the Net what had only been available on the personal desktop computer. This navigation system evolved into the first graphical browser, Mosaic, which was developed by Marc Andreessen and other students at the University of Illinois and was released in January of 1993. (Marc Andreessen later helped cofound Netscape Communications, a company that at one time commanded almost 80 percent of the Internet browser market.) It seems safe to say that 1993, the year the first graphical browser was developed, was the birth event of the World Wide Web.

E-mail and the Growth of Web Servers

For many people, e-mail is the introduction to the Internet. E-mail provides a cost effective and easy way to communicate with family, friends, and colleagues across the country and around the world. In addition to being inexpensive, e-mail is attractive because it is asynchronous; participants in communication do not have to be available at the same time. The popularity of e-mail is perhaps best evidenced by the numbers: Internet users sent approximately six billion e-mail messages in 1997. Estimates from the Internet Software Consortium, <http://www.isc.org/>, indicate that 29 million hosts and approximately 120 million users around the world were on the Web in January 1998. By July 1998, the number of hosts was estimated at close to 37 million, and a year later, the number exceeded 56 million. At current rates, growth in user count is expected to double every year. According to Wirthline Worldwide, by 1996, 16 percent of the U.S. population was online; that number increased to 34 percent in late 1998. These figures substantiate what we already know: the Internet and the Web have become important features in today's world.

The basic function of communication via the Internet is generally well supported by the infrastructure already available on most campuses and by commercial services. E-mail provides a convenient way for faculty to communicate with students quickly, easily, and from almost any location. It is also helpful in communicating with groups, from large classes to small project teams, and it is an excellent way to maintain contact with colleagues on campus and at other institutions. E-mail is not the only use of the Internet for education, however. Various types of access to the Internet, to research, and to data services are now available. As our campuses begin using the Internet for teaching and learning, we need to pay attention to other pieces of the infrastructure that support our mission.

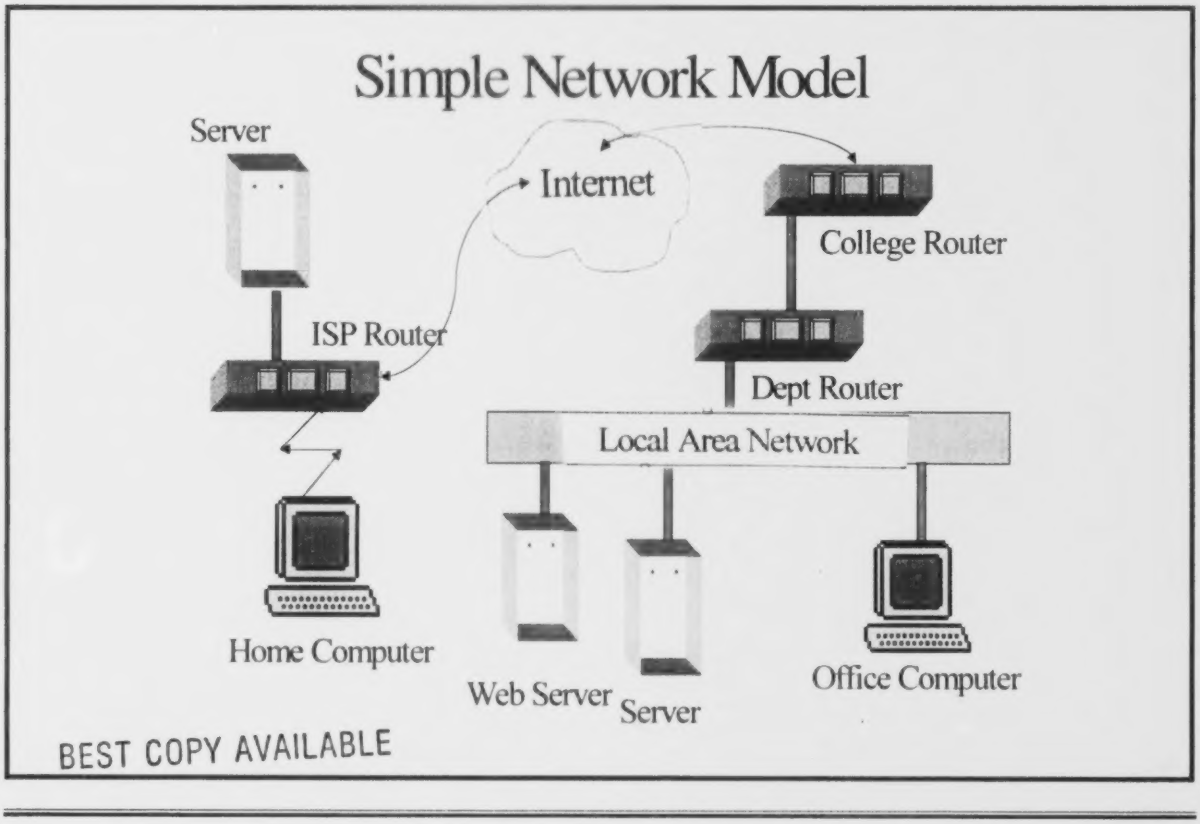
Infrastructure of the Network

Teaching courses on the Web requires that a certain set of components be developed and managed by faculty, administrators, or staff. Commercial vendors offer to design and move courses to the Web, but they do not teach the courses. These vendors are able to provide the Web servers and the Internet access service, and they will work with faculty to design and move course content into a site on the Web. This approach can be a good strategy for small institutions or for institutions with little information technology support, but some knowledge is necessary to evaluate the costs and control tradeoffs.

The basic infrastructure of the network consists of hardware in the form of network servers, wires and cables, routers, and personal computers. The network also relies on a set of software and applications that, fortunately, are now fairly standard. A very simple model of a hardware portion of the network is illustrated in Figure 1.1.

Faculty and students may connect to the Internet through home computers, modems, and local phone lines linking them to a local Internet Service Provider (ISP). The process is relatively simple. When a modem attached to the computer dials into a modem at the ISP, a modem-to-modem link is established over a regular phone

Figure 1.1. Simple Network Model



BEST COPY AVAILABLE

line. Once the link is established, the router and server check for the account and password of the user before approving access to the Internet. If approved, the user can access any content, Web, or server that he or she has permission to view.

Accessing the Internet from an office works in much the same way. For example, faculty and staff offices and student computer labs on a campus may be linked to a local area network (LAN). Generally, the LAN hooks the entire faculty and support staff to a special computer called a router that serves as a gateway to the network. This process eliminates the need for a modem in each office and lab computer.

The Internet is built from multiples of these simple components. As a consequence, the Internet is both very robust and very fragile. Its power comes from the redundancy that is provided by a network of computers offering multiple paths. If one router, server, or computer is broken, slow, or problematic, the data are still transmitted successfully and quickly across the network because the routers and gateways use alternate pathways. The system is strong, but the ability to use the network is very dependent on immediate access points. If the college router is down or overburdened, we experience the frustration and anxiety that come from a slow or unavailable network. On the occasional morning or afternoon that network problems occur, the pace of work changes dramatically. If the department router is down, we may be unable to access data, applications, or e-mail. Our reaction may be similar to the discord we feel when the electrical power is interrupted. We change how we work. We change our expectations. We have another cup of coffee. We gather in groups to talk about what we can't get done.

Given the design of the network, the potential exists for multiple points of failure, including performance problems with network hardware or software. As a result, one of the core principles of planning for teaching and learning on the Web is to plan for multiple servers, backup servers, and network redundancies. Also, given the need to be available for learning anywhere, anytime, we need to plan for 24/7 access–24 hours a day, seven days a week.

Network Software and Web Applications

In addition to the hardware, layers of software support the network and other applications. Sometimes called middleware, these layers include the software on the network for routing, management, and data flow; the software on the Web server to control access; and the software in the browsers used to access the servers. Middleware can also refer to the components of the software on the server that manage our course Web sites.

E-Mail Software on the Internet

Internet access and e-mail are in some ways similar to the postal service, but the digital systems are still new and relatively fragile. The language of e-mail has its corollaries with the postal service and with telephone systems. We have e-mail mailboxes, e-mail addresses, online directories, yellow pages, and computers dedicated as mail servers. Our computers have Internet Protocol (IP) addresses, our hand-held organizers have addresses, and our cellular phones have addresses. We have powerful online directories that enable us to track down friends and family, and the amount of junk e-mail is starting to rival that of traditional or "snail" mail.

The setup and installation of software for communicating over the Internet is now much easier than it has been. The following items are necessary for e-mail and online access:

- **Hardware** to access the net, usually a computer and modem. WebTV is a relatively new alternative in hardware, and we will soon see other choices as well.
- **Software** to help manage e-mail. Software can be a simple application provided by an Internet browser, such as Netscape, or more specialized mail programs, such as Eudora Pro, Microsoft Outlook, or many others.
- An **Internet account** that supports access to the Internet. This account can be arranged with a local ISP, or a college may offer options for faculty, staff, and students.

- An **e-mail account** for sending and receiving messages.

- A **mailbox on a mail server**, where messages are stored until they are retrieved. The mailbox is often arranged at the same time as the Internet access account; however, other options are available. For example, a user may arrange for Internet access with an ISP but use an e-mail account at school or work. Storing e-mail is also a consideration, as users may elect to keep messages on the personal computer, on the mail server, or on a disk.

Basic Principles

For many of us who entered the teaching profession before the advent of personal computers, the presence of the Web is causing us to rethink many aspects of our teaching. We may want to reconsider what is important for our students to learn, and we may opt to change many parts of the learning experience itself. We may want to reexamine the role of teachers and move ourselves away from the center of the course. The power to communicate on the Internet is the power to design communication among others for more effective learning. This is all hard work, but it is a challenge we must address. The good news is that we don't have to do it alone.

As we explore the processes and implications of using the Web for teaching and learning, we want to emphasize the following principles:

- The Web will continue to change and grow.
- Web courses will need to change and grow with it.
- Technology plans need to include accommodations for network overloads, technology breakdowns, and backups and recovery.

CHAPTER 2
PRINCIPLES OF TECHNOLOGY AND CHANGE TO GUIDE OUR JOURNEY TO THE WEB

Overview

This chapter includes an overview of changes in communication technology in the last hundred years, a discussion of the technology dissemination process, and a set of principles for the wise and manageable use of technology. These principles reinforce campus policies that advance faculty, staff, and student change to a learning environment supported by technology.

In addition, this chapter illustrates how the creation of new teaching and learning environments can follow designs that support professional beliefs, principles, and ways of working in education. Key statistics and trend lines about the adoption of technology are presented, including data on personal computer ownership by faculty and students, ease and affordability of Web access, and campus strategies for supporting the technology needs of faculty and students.

Introduction to Technology and Change

If, as the *American Heritage* definition states, technology is the "application of science, especially to industrial or commercial objectives," our idea of technology may not be well represented. Our purposes would perhaps be better served if the definition also included "educational objectives." Lacking that, we propose the following:

> The technology of education is the body of materials and methods used to extend or enhance the ability to learn, collect data, solve problems, and promote communication between and among faculty and students.

Thus, paper, pens, pencils, books, television, radio, VCRs, and audiocassettes are all parts of technology that enhance learning and communication. Given that the root of technology, *tekhne*, means art or skill, we have always used technology in education. The difference today is in the kinds of technology we use and the speed at which technology is changing.

In the early part of the 20th century, before paper and pencils were broadly available, students used slates, which provided very little space for storing and analyzing thoughts and information. By contrast, we hear today's students and faculty complaining that floppy disks are now an almost outmoded form of storage because they hold only two megabytes of information. Many new computers do not have floppy drives, providing instead drives that support removable storage of 100 or 200 megabytes and CD-ROM drives accessing CDs with 650 megabytes–and much more to come–of data.

The broad definition of technology as any tool to enhance or extend the brain suggests that we take a second look at the technology and tools of learning. How quickly do we adopt new technology? Are we different today than our predecessors were?

Principle One: Good Use of Technology Takes Time

In the late 19th century, the best way to communicate across long distances was by telegraph, and in the United States, Western Union dominated the use of the technology. When the telephone came along in about 1876, analysts at Western Union judged that "this (new) telephone has too many shortcomings to be seriously considered as a means of communication. This device is inherently of no value to us." Now, 125 years later, a derivative of that early telephone technology is with us everywhere, hanging from our belts, in our purses, in our cars, and in our pockets. One phone number can find us anywhere.

Typical of fledgling technology, the 1876 telephone was awkward, expensive, and didn't seem to fill any particular need. One key principle of technology dissemination is that good uses of technology take time to develop. Therefore, we need to be patient with ourselves and each other.

Another major 20th century technology was also initially received with derision. An associate of David Sarnoff–later the head of RCA–looked at his technology and remarked, "The wireless music box has no imaginable commercial value. Who would pay for a message sent to nobody in particular?" Now, of course, we have radios or boom boxes wherever we are and entire industries depend on broadcasting messages, movies, and educational programs to no one in particular! We also now can see a future with "narrowcasting" emerging as a powerful force reaching out to folks all over the world with specific interests. If you are a former Minnesotan and still love listening to WCCO, you can do that with the Web!

Principle Two: Not All Technology Thrives or Survives

The telephone and radio, two examples of successful innovation, lead us to the second principle of technology change: Not all technology evolves to be a practical or dominant force in our daily lives. We know that high cost and difficulty of use are often major deterrents to the adoption of new technology. Technology does not become cost effective until it is commercialized and widely available. For example, videotapes were not widely used in distance education until VCRs were in the majority of households. This principle–that not all technology survives or thrives in its original form–reinforces our natural abhorrence of change and suggests that educators would be wise to wait and watch how technology develops.

In a study of the diffusion of innovations, Everett Rogers (1995) noted that the critical time for a new innovation is when the technology has been adopted by between 10 and 20 percent of a population. The theory of innovation suggests that after technology reaches this percentage range of a group, "it is often impossible to stop the further diffusion of a new idea, even if one wished to do so" (Rogers, 1995, p. 259). This important attribute of innovation theory enables us to predict when technology has reached the "no turning back" point and allows us to plan for widespread use and integration.

For example, when the ownership of personal computers reached the 25 percent diffusion point in 1992, it became relatively safe to predict that at some point in the not too distant future, close to 85 percent of the population would have personal computers of some type or manifestation. So, even if one chose to wait and watch, serious planning for computing should have started about a decade ago.

By 1990, the education community recognized its need to accommodate and embrace personal computer technology. A compelling reason for this adoption was the personal computer's ability to manipulate data. Information, dialogue, and communication are the fundamental processes in our daily work of research, teaching, and learning. A second compelling reason was that it had become clear by that time that this technology and many related technology innovations would be adopted and improved.

Principle Three: Continued Technology Growth Can Be Assumed

Knowing the rate at which the technology is going to be improved in power and reduced in cost is also possible. Gordon Moore, former CEO of Intel Corporation, predicted in 1965 that "the power of computer chips will double every 18 months." This statement is now known as Moore's Law, and it has held true for over 30 years. In recent years, experts have thought that fundamental laws of physics would put a stop to this rate of development; however, two breakthroughs announced in late 1997 suggest that the pace of technology innovation will not slow down anytime soon, at least not in the next five to ten years. Intel Corporation announced a new stacked chip technology that allows a chip to hold twice as much information as it previously could. IBM announced an improved way of making computer chips with copper, which promises faster, less expensive chips.

We have already discussed the Web and its fantastic rate of growth. While the personal computer, when not networked, is a powerful teaching and learning tool, the most significant feature of the networked computer is its ability to serve as a communication device. The networked computer supports all the communications that serve as the very essence of teaching and learning processes. A 1998 campus computing study reported that the use of e-mail as an instructional resource in community colleges courses exploded between 1994 and 1998, rising from 3 to 26 percent (Green, 1999, p. 4). (Note that the magic point of innovation adoption has been reached.) In public universities during the same period, use of e-mail in courses increased from 10 to 56 percent. Similarly, between 1995 and 1998, the percentage of courses with Web pages rose by 300 percent in public research universities and grew 500 percent in private research universities. Increases at community colleges were less dramatic, but were still significant, growing from about 6 percent to 14 percent (Green, 1999, pp. 3-4).

By considering statistics like those presented in Chapter 1, we could have predicted with some level of confidence that the Web would become a significant change force in our daily lives. Certainly, the point of successful diffusion has been reached, and there is no turning back, even if we desired it. This integrated technology–personal computing, networking, and the World Wide Web–is here to support much needed change in education.

Principle Four: People Adopt Innovation at Different Rates

The rate of adoption of new technology generally follows a bell curve, with limited numbers of adventurers and timid souls, and most others in the middle. Rogers (1995) found that individuals fell into a distribution of five categories of adoption of innovation: the Innovators (2.5 percent), the Early Adopters (13.5 percent), the Early Majority (34 percent), the Late Majority (34 percent), and the Laggards (16 percent). A description of each category is provided in the following paragraphs.

Innovators. Another way of describing the technology Innovators (2.5 percent) is that they are "heat-seekers," adventurers, and thrill-seekers. Innovators are easy to spot. They always have some of the latest techno-gadgets, and they spend much of their time and resources testing, exploring, and trying new techno-tools. Innovators boast to others about the capacity of their hard drives, the speed of their computer chips, the extent of their computer memory, and the latest software innovations they have acquired. They may form information-sharing relationships with other Innovators, receiving mutual support and feedback in their exploration of these tools. In higher education, Innovators serve as gadflies to encourage and push administrators to plan for technology integration into teaching and learning. They are the cadre of faculty who regularly submit project proposals for testing and developing the use of technology for teaching and learning.

Early Adopters. Early Adopters (13.5 percent) have many of the characteristics of Innovators, but they generally are more judicious in their enthusiasm. They like to test new techno-gadgets and tools to see how they might work in various situations. They carefully assess an innovation and commonly serve as consultants to others who are seeking information about the effective use of technology. While the Innovator is usually considered "far-out" and different from the majority of individuals, Early Adopters are closer in peer relationships and serve as an important bridge between Innovators and members of the Early Majority.

In higher education, Early Adopters serve on the most committees as resources to decision makers about strategic technology decisions. Early Adopters may also brag about memory, hard disk space, and gadgets, but they do so in a more subdued manner than do Innovators. Early Adopters and Innovators are the members of the campus community who have consumed many of the resources of the computing help desks. Innovations in technology tend to be more difficult to use when they are new and may be unreliable or unpredictable because appropriate infrastructures are not in place to support them. Thus, both Innovators and Early Adopters tend to have a high tolerance for ambiguity and uncertainty and are good independent problem solvers.

Early Majority. By the time the Early Majority (34 percent) begins adopting the use of e-mail and computers in instruction, campus computing resources are beginning to be strained. The numbers of students, faculty, and staff who need support at this stage is the total of Innovators, Early Adopters, and Early Majority, a number approaching close to 50 percent of the campus community.

The characteristics of the Early Majority–deliberate, cautious and precise–result in much higher expectations of technology and the support infrastructure. The best approach for encouraging faculty to use new technology is to have members of the these early groups speak to them. Occasionally, there can be drawbacks with Innovators meeting with faculty, but such meetings are worth the risk.

Late Majority. Members of the Late Majority (34 percent) adopt new technology at the point when hanging on to the old technology becomes more problematic than moving to the new one would be. Late Majority members are skeptics and generally have fewer resources to support their transition to new technology. By the time the Late Majority begin using the new technology, the number of bugs are much reduced and, generally, the technology is much easier to use. By this time, more of the support infrastructures are in place and more colleagues are knowledgeable about the technology. The Late Majority only want to use the tools to do their work and aren't interested in how the technology works; they care only that it does work, and that it works reliably. Members of the Late Majority can be predictably impatient and difficult, and they are likely to complain if the new technology is unreliable or unstable. They have very high expectations, assuming the new technology to be better and more reliable than the old technology or "all these other folks wouldn't be using it."

In higher education, members of the Late Majority often are found on tenure review committees and curriculum review committees, and they often are members of the faculty union and faculty senate who are comfortable with predictable results and consequences. Applying known principles of change can help communicate, persuade, and engage members of the Late Majority.

Laggards. Laggards (16 percent) adopt new technology only when they have no other choice. Intensive initial training and support can help Laggards adopt new technology. If little additional support is provided, however, Laggards use the technology inefficiently, if at all. Stories abound of new computers, still in boxes, sitting in corners of offices.

Many stories circulate describing the ways Laggards can be brought on board through the use of e-mail. A typical scenario describes a high-level administrator who, wanting to improve the efficiency of communicating with his or her group, decrees e-mail as the one and only communication method the group will use. Of course, Laggards are quite inventive when avoiding the use of new technology. A Laggard will have an assistant print the e-mail, then will generate a response on paper, to be e-mailed by the assistant.

Where Do You Fit? When deciding to which innovation group we belong, remember that we can be Innovators in one category of technology and Laggards in another category. Keep in mind that readiness to accept new technology is neither good nor bad. Instead, it clarifies why a person responds to technology in a certain way. A person's state of readiness for the use of technology for teaching and learning also predicts the speed at which he or she will want to include technology design in teaching environments and courses.

The principles behind the technology adoption curve and the change processes that accompany technology adoption can lead to changes in the ways we perceive our roles and function in them. However, many new technology innovations are needed before the stage is set for a full paradigm shift. With all the new technology supporting computing, networking, and the Web, we, as members of the higher education community, are in the middle of the largest paradigm shift in education in hundreds of years. We need to look at how paradigms shift so we can prepare ourselves for the shift and take our first steps toward it.

The Process of a Paradigm Shift

As new technology is introduced into an environment, we can predict the way it will first be used. Because one of the difficulties of new, unrefined technology is the lack of practical uses for it, new technology is usually first used in games. As a technology becomes more developed, four general stages of technology adoption occur.

Stage 1. In the first stage of technology adoption, people use new tools to do the same thing in a new way. The first educational use of the computer for example, was for drill and practice applications or tutorials. These early programs were used to present the popular workbooks in reading, math, and language. Computers were sometimes called expensive technological workbooks, and with good reason. As another example, the first use of a video camera was to take moving pictures of a stage play. In this first stage, difficulties lie in justifying the benefits of new technology and determining whether it is as good as the old technology.

Stage 2. Often, the next stage is the use of the technology to improve the efficiency of existing processes. Word processing evolved to speed the process of writing letters; spreadsheets evolved to speed the process of budgeting. Little or no thought was given to how word processing and spreadsheets would shift the work and roles of secretaries and managers.

In higher education, one of the first uses of computers by faculty in teaching was to deliver more visually effective lectures. Efficient simulations of difficult concepts save faculty time and students frustration when learning tough new relationships and interdependencies. Faculty spent many hours moving "yellow-pad" lectures to HyperCard and the computer. Over time, classrooms have become equipped with computer projection equipment so that the improved lectures can be displayed to students. In this second stage, justifying the cost and time investments of new technology is still difficult, largely because all the costs and time are generally added to existing processes.

Stage 3. In this stage, costs are decreasing and the tools are becoming more widespread and easier to use. In higher education, faculty are finding that faculty-to-student communication is enhanced by the use of e-mail and synchronous and asynchronous group meetings. Faculty can dispense with onsite office hours, holding them on the Web instead. Some economies of time can be achieved.

As educational technology achieves greater dissemination, the teaching and learning processes need to be reexamined. How many letters really need to go through the mail? How many times do students and faculty really need to get together physically? We have been in the "classroom and books" paradigm for hundreds of years. We are loath to change anything that has worked for so long, but computer technology has transformed the environment in which we operate so greatly that we are now at Stage 3 of the paradigm shift.

Stage 4. In this stage, the new tools are used to solve old problems from the previous paradigm. For example, one of the most significant problems with many distance education models of the past was the lack of interaction, within a reasonable time frame, among the participants. Our new communication technology overcomes that problem.

In solving that problem, however, we have discovered another challenge of distance learning: increased demands on faculty time. If faculty can communicate regularly and consistently, student expectations rise, creating greater demands on faculty time. A comprehensive paradigm shift requires a whole new set of tools, applications, and services. We are not there yet.

While many of our new tools for communication technology have arrived, these tools are in a relatively immature stage of development. In many ways, we are using new technology to do our teaching and learning in the same old ways. The need for patience is clear, as is the need for planning. Improved tools will emerge that are less costly and easier to use. Very soon, we will create new environments for teaching and learning.

In *Paradigms, the Business of Discovering the Future*, Joel Arthur Barker (1993) asserts that the most important lesson of paradigm shifts is, "When a paradigm shifts, everyone goes back to zero" (p. 140). This means that in the use of new technology for teaching and learning, all faculty become novices again. For administrators, it means that faculty need support in becoming proficient in the use of tools for teaching and learning once again.

What Will the New Environment for Teaching and Learning Look Like?

We would like to share one more guiding principle in the theory of innovation. We often think that creating a new environment simply may not be possible. We may think that we are too stuck in our ways to change our current paradigm. Change is difficult. It takes time, energy, resources, and altered attitudes. So how do we make this happen? How might it be possible?

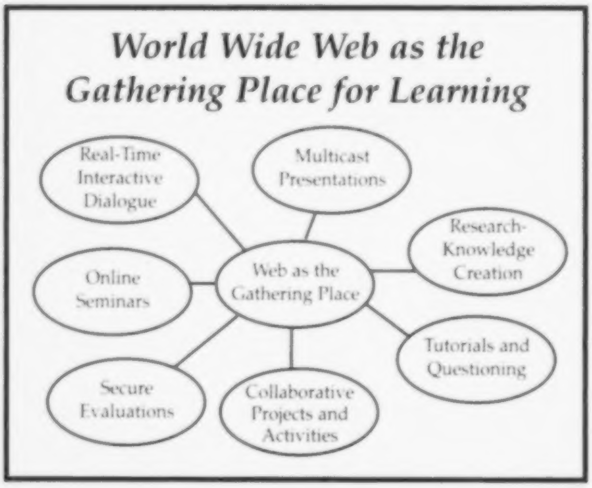
Tracy Goss (1996), in *The Last Word on Power*, states, "When you declare a new context, you create a new realm of possibility, one that did not previously exist" (p. 19). Goss provides an example of this process by reminding readers of the power of the statement made by John F. Kennedy when he declared that we would be on the moon by the end of the decade. He created a context in which getting to the moon was believed to be possible. He, and the American public by agreeing to it, created a belief system that this was possible. Resources and talent were allocated on the basis of this belief system.

In a similar fashion, the few dozen higher education institutions that have mandated 24-hour student access to computing and networking have created a new context for teaching and learning. This new context supports the fundamental processes that occur in teaching and learning: communication, dialogue, creating knowledge, and sharing knowledge.

Today we rely on the classroom as the beginning and ending point of the course experience. Tomorrow's classrooms are taking shape today on the Web. One possible shape of the new classroom begins with a shift from the classroom as the primary place of organized instruction to the World Wide Web as the center for instruction, as the "communication hub." As we look ahead five to ten years, will we see all our course experiences begin and end on the Web?

Figure 2.1 shows a possible "midstate" of the new teaching and learning environment to which we may be moving. This graphic shows the center of organized instruction as the World Wide Web. This does not mean that the classroom disappears. Instead, it means that the classroom is no longer "front and center" for course gatherings. It means that the primacy of the classroom is past.

Figure 2.1. The Gathering Place for Learning


World Wide Web as the Gathering Place for Learning
Real-Time Interactive Dialogue
Multicast Presentations
Research-Knowledge Creation
Online Seminars
Web as the Gathering Place
Tutorials and Questioning
Secure Evaluations
Collaborative Projects and Activities

BEST COPY AVAILABLE

Consider the usual elements of our higher education course experiences: class meetings, independent study time, projects, tests and evaluations, demonstrations, and discussion. Which of these communication experiences must occur in a shared physical space at the same time? Which of these experiences are actually improved when they take place in the traditional classroom? And what about experimenting with a new balance of class meetings, individual and group study, and research? The new paradigm may seem to be only a shift in the emphasis of meeting places, but it will change almost everything.

CHAPTER 3
WHAT WE KNOW ABOUT TEACHING AND LEARNING

Overview

After more than a century of educational research, we have a body of knowledge about what does and does not work in teaching and learning. Even though teaching is often considered an art and the best teachers are most often viewed as master crafters, we now have available to us some principles of learning and instructional design. Many postsecondary faculty do not make use of this body of knowledge, however. The reason is simple. We have been teaching and learning in the same familiar classroom environment for a long time and have come to rely on our instincts and tradition rather than pursue the study of theory and principles.

The coming of the Web environment brings with it the need for everyone involved in teaching and learning to develop more explicit knowledge about designing effective educational experiences, because our prior experiences may have not prepared us for the possibilities in this new context. We are wise to reexamine the fundamental processes involved in teaching and learning.

Through a fresh look at how we teach, we can identify a core set of principles for designing and creating effective models of teaching and learning for the information age. We need these basic principles to help us cope with the newly available possibilities.

This chapter summarizes the principles from three schools of learning theory. Basic tenets derived from those theories guide the design of effective teaching and learning, whether in the classroom or in the new Web environment. The principles are then applied to the design of teaching and learning for the Web.

The Web as Gathering Place

As the World Wide Web becomes the new gathering place for teaching and learning, it may, in some cases, replace the classroom as the primary site of organized instruction. Shifting from the physical boundaries of the classroom to the virtual space of the World Wide Web causes us to ask many questions about the functions, the rules, and the freedoms we have in this new environment.

Moving from the traditional classroom to the Web does not necessarily mean that the physical classroom disappears. Rather, the Web will likely become the primary place of instruction, and the classroom will assume a secondary role. Students will go first to the Web for the course launching and for a guide to the program; they will register for classes online and will probably purchase and subscribe to class materials online. They will introduce themselves to their fellow students online, and they may meet their teacher for the first time online. The classroom will continue to be used for the educational events for which it is best suited. However, the number of times we use a classroom may be reduced, while the number of hours we spend in a classroom for each meeting may increase.

Why Do We Teach the Way We Do?

Many faculty in higher education have a great deal of experience in designing and delivering instruction, but they may not have had the time or opportunity to learn about teaching and learning in any formal way. Rather, postsecondary faculty generally come to the teaching experience with a high level of competence in a content area. They then learn about teaching and learning through peer observation, collegial discussion, trial and error, and their own educational experiences. Most of us as faculty are actually "unconscious competents" in the area of instructional design. We know what to do, but we don't know why. Given the need to support a new environment, it is important to learn the "why" of what we know.

Our current classroom paradigm for teaching and learning has many constraints. We have adapted to these constraints and accepted them. Yet the principles of effective learning suggest that new environments are needed. Consider the difficulty of holding small group discussions in a large lecture hall with immovable seats. How effective is collaborative work in a computer lab where students cannot see their classmates over the monitors? How interactive can a class of 400 students be in the hour allotted for class? How do we encourage students to use interactive strategies to learn large amounts of content? These are only a few examples of the many challenges associated with implementing interactive learning.

The beauty of the Web is that it provides an entirely new context for teaching and learning. It removes the physical and time constraints for *instructors* as well as learners. Moving a course to the Web presents the perfect opportunity to return to the core principles of teaching and learning to create a new pedagogical model for our practices.

Principles for Designing Learning

Building a Foundation of Learning

Pedagogy is the art or science of teaching and can serve to guide us in rethinking the teaching and learning process for new environments. Pedagogy traditionally builds on the following four core components:

- The learner
- The teacher
- A task to be completed with the help of a teacher
- The knowledge needed to complete the task

This particular description of the four core components of the teaching and learning process is from Vygotsky (1962) and his theory of the Zone of Proximal Development (ZPD). This sounds elegant and, in fact, it is. It combines the basic principle of readiness for learning with manageable steps in learning. Vygotsky's thinking on the ZPD is examined in more detail later in this chapter.

The ZPD teaching and learning model does not really describe the classroom model to which we are accustomed. You might observe that teaching and learning with these four critical elements can happen anywhere, anytime. Learning happens when a toddler helps another build a tower of blocks; when parents show teenagers how to barbecue chicken; and when adults learn how to use word processors, repair marine engines, or use technology in teaching and learning. Teaching and learning occur not only in the classroom, but also in many places throughout our lives.

This learning model provides a good place to start our quest for the fundamentals of learning. Seemingly, the most significant trait of this learning model is the focus on the task to be completed. The core element of any teaching and learning experience is the existence of a problem to be solved or task to be performed by the learner. This challenge focuses and engages the learner and specifies an assessment of the learning. If the learner solves the problem or completes the task, the learner knows something new and can then move to another problem or task.

This view of teaching and learning eases our shift in thinking about what and where learning can occur and how to design effective learning. Our design task centers on the learning and the learner.

Strategies for Instructional Design

The field of pedagogy includes the principles of instructional design that specify the instructional strategies for teaching and learning. An instructional strategy is a simple concept: it is a communication activity used to engage the learner in a task and to assist the learner in acquiring the knowledge necessary to complete the task. Instructional strategies include, for example, lectures, discussions, reading assignments, panel presentations, study projects, and tests.

The instructional strategies used to assist learning generally depend on one or more of three basic modes of dialogue and communication:

- The dialogue between the instructor and the student
- The dialogue between the student and instructional resources
- The dialogue between and among students

Scholars have suggested that a rough measure of a design goal for undergraduate education be a balance of these three dialogues (Pelikan, 1992, p. 61). Designing a course of instruction with a balance of these three dialogues is important in distance education and in Web environments (Boettcher, 1995).

The opportunities for communication and dialogue in an online Web environment are even greater than they are in the classroom because the spatial and physical limitations of the classroom vanish. Communication in the online environment can be either synchronous or asynchronous, and may be either one-to-one dialogue, as in e-mail, or one-to-many dialogue, as in broadcast e-mail or Web site communication. When designing a teaching and learning environment on the Web or in the classroom, the principles and processes of instructional design provide a plan to follow.

Instructional Design in a Nutshell

Chapter 5 provides more detailed information on the instructional design process. For our purposes now, here is the process of instructional design in a nutshell.

Instructional design is a four-step process:

1. Analysis
    - of learner characteristics
    - of the context of the learner
    - of the problem and the accompanying needed knowledge
    - of instructor variables
2. Determination of goals and objectives
    - What do I want my students to know?
    - What do I want my students to be able to do?
    - What do I want my students to think as a result of the instruction?
3. Selection
    - of teaching strategies
    - of content
    - of assessment procedures
4. Evaluation
    - by the instructor
    - by the institution

Although many successful teachers have developed skills in instructional design by osmosis and instinct, several principal schools of learning theory can validate what we are currently doing in the classroom and can guide us as we design instruction for the Web.

Principal Schools of Learning Theory

The principal schools of learning theory incorporate the fundamentals of learning, and the basic principles of instructional design are derived from these theories. Prominent educational theorists in each of the conceptual areas serve as touchstones through the maze of learning theories.

Anyone who has been teaching for any length of time has developed a philosophy of teaching and learning. This philosophy includes–often without the practitioner knowing it–a view of who the student is, what the student brings to the task of learning, and what the student needs to know and do after completing a particular course.

The principal schools of learning theory can be examined in the same way. The primary theories included in this section are **behaviorism**, **cognitivism**, and **constructivism**.

Behaviorism

In behaviorism, the goal of learning is to shape a learner's response to a set of stimuli. Behaviorists believe that the core educational process accustoms, trains, or conditions a learner to respond in a certain way, given a certain stimulus.

B.F. Skinner

The most prominent of the behaviorists is B.F. Skinner. He believed that a learner would behave in a certain way by interacting with a manipulated environment. The interaction with the environment and the stimuli within the environment could cause an observable behavioral change in a learner. While Skinner is most remembered for his focus on the external stimuli and the ability to train behavior, one of his long-term research goals was to find ways to make the education of children much more efficient.

Key Thoughts

According to Skinner, the external behavior to be shaped and maintained in education is usually verbal and is brought under the control of both verbal and nonverbal stimuli. A verbal behavior is acquired when either a verbal or nonverbal stimulus causes the verbal behavior to be ready and available. In many respects, a common example of this is the set of manners and customs that we all need to acquire to be successful in the full range of daily interactions with others. When people ask, "How are you?" they are issuing a greeting; rarely do they want or expect a health status report.

Skinner also envisioned a learning machine to serve as the environment for teaching a range of verbal and nonverbal behaviors. He acknowledged, however, that such a teaching machine would be distinct from a teacher. He wrote:

> If our current knowledge of the acquisition and maintenance of verbal behavior is to be applied to education, some sort of teaching machine is needed. The machine itself, of course, does not teach. It simply brings the student into contact with the person who composed the material it presents. It is a labor-saving device because it can bring one programmer into contact with an indefinite number of students. (Skinner, 1958, p. 97)

If we extrapolate just a little further, might we consider the Web as a teaching machine because of its ability to bring the student into contact with the teacher and other learners? Many good tutorials and simulations that are now available could easily be categorized as teaching machines. Simulations such as *SimCity* provide complete worlds or environments that enable students to interact with sets of programmed options and consequences.

Implications for Teaching and Learning

Under a behaviorist theory of learning, the teacher defines and controls the instructional environment with which the student interacts. The instructor assesses student progress based on a demonstration of the target behaviors that the environment is designed to elicit.

In today's teaching and learning environments, the temptation is strong to dismiss behaviorism because of its focus on external control and stimulus. However, many skill development activities can profit from behaviorist theory. Basic skills in math, reading, and language, or any skill whose mastery requires practice, can be well suited to behaviorist environments. Skills that require complex integration of muscle memory and cognitive processing–like surgery, piloting, or lab work–can benefit from thinking about the importance of environments. Perhaps the best current example of teaching and learning environments that incorporate behaviorist thinking are the airplane simulators used to train pilots. The wealth of tutorial and simulation materials, particularly for the first two years of undergraduate education, could be used in Web courses.

Instructional Design Principles: Part I

A key principle of instructional design is to review and examine existing materials to see if they can be used to achieve stated goals and objectives. The following three key instructional design principles come from the behaviorist theory.

- Identify the goals and objectives to be learned.
- Create an environment for learning that assists the learner in acquiring these goals. This new environment includes the stimulus or task that will engage the learner.
- Review, examine, and consider adopting or adapting existing materials before developing new ones.

Cognitivism

The school of cognitive learning theory centers on the belief that learning occurs when a learner processes information. In this theory, the input, processing, storage, and retrieval of information are at the heart of learning. The instructor remains the manager of the information input process, but the learner takes an active role in planning and carrying out his or her own learning. Instruction is not simply something that is "done to" learners, but also involves learners and empowers their internal mental processes.

Jerome Bruner

Jerome S. Bruner, a leading representative of the cognitivist school of learning, first espoused interactive cognitive development theories. Bruner stressed social interaction as an integral part of information processing and was also a strong proponent of discovery learning. He believed that mastery of the fundamental ideas of a field involved not only the grasping of general principles, but also the development of an attitude toward learning and inquiry, toward guessing and hunches, toward the possibility of solving problems on one's own (Bruner, 1963, p. 20). Discovery learning was not a random event for Bruner. He endorsed problem solving through structured searching strategies as an integral part of discovery learning.

Key Quote

> The first object of any act of learning, over and beyond the pleasure it may give, is that it should serve us in the future. Learning should not only take us somewhere; it should allow us later to go further more easily. (Bruner, 1963, p. 17)

The focus of this thought is twofold. Bruner emphasizes that learning should be purposeful, developing skills to serve us in the future. Second, every time we learn something new, we add to a cognitive structure upon which we can build more later; as we build, we are able to learn more and to learn faster.

Implications for Teaching and Learning

The primary implication of cognitivist thinking on teaching and learning is the importance of structuring experiences that involve the learner as an active participant in the process. The more instructional design can incorporate activities that require deep-level processing, thinking, and manipulating of content by the student, the more we increase the probability that effective learning will occur. In the Web learning environment, this can mean giving students tasks that involve exploring and discovering goals, finding and organizing material, and synthesizing content.

Lev Vygotsky

Lev Vygotsky is a prominent cognitivist who introduced the idea of the Zone of Proximal Development (ZPD). In the ZPD, the learner, teacher, and content interact with a problem that requires resolution. The ZPD represents the difference between what a learner can do individually and what the learner can do with the help of more experienced people, including other learners, experts in the field, and the instructor. The concept of the ZPD also reinforces the importance of the principle of readiness, which is often studied in relation to a child being ready for reading. However, readiness is a prerequisite for the effective learning of concepts and skills at any age.

Key Quote

> The Zone of Proximal Development defines those functions (of a learner) that have not yet matured, but are in a process of maturation, functions that will mature tomorrow but are currently in an embryonic state. These functions could be termed the "buds" or "flowers" of development rather than the "fruits" of development. The actual developmental level characterizes mental development retrospectively, while the Zone of Proximal Development characterizes mental development prospectively. (Vygotsky, 1978, pp. 86-87)

In Vygotsky's description of the ZPD, learning is depicted as the budding or flowering of a particular knowledge or skill. This description of ZPD also suggests that the window of learning for an individual learner might be a fairly narrow and specific one. This window of learning, or readiness principle, has always been a challenge for teachers. Because the lecture method may not ensure that all students are at the appropriate readiness point for learning to occur, learning activities may need to be customized to the individual learner.

Implications for Teaching and Learning

The primary implication for the design of teaching and learning environments and materials from Vygotsky's way of thinking is the importance of providing a range of activities and content for any group of learners so that the learners can customize their own learning within a framework of the larger goals and objectives of a course. While all students will need to master a core set of concepts and principles in any unit, Vygotsky's ZPD suggests that we also provide ways for students to customize their learning within that framework.

Instructional Design Principles: Part II

From the cognitivist theory, two additional basic instructional design principles are added:

- Design courses to include problem solving, and provide sufficient help and resources to assist the learner in solving problems. Structure problem solving in steps so learners can be successful in building their own solutions.
- Analyze learner readiness for learning the core concepts, principles, and attitudes of a course. One traditional way of ensuring readiness for learning in higher education is by establishing prerequisites for a course. Other traditional ways of ensuring readiness include using skills assessments in math, science, and writing courses. In our new information age, testing can be more specific and targeted than it has been in the past. The readiness challenge can be addressed either by admitting only those students who are indeed ready or by building sufficient preparation and support into the course.

Constructivism

Constructivism is an emerging learning theory that is an extension of cognitivism. In this theory, the focus is on the learner as someone who constructs knowledge for himself or herself. Constructivism is influenced by the principles of information processing theory as developed by Bruner and Vygotsky and by the work of philosopher John Dewey and adult learning theorist Malcolm Knowles.

As in cognitivist theories, the learner in the constructivist learning theory is an interactive participant in the learning environment; however, in constructivism the learner is viewed as the creator and processor of the educational experience. Constructivism emphasizes student-to-student interaction as an important component of the educational environment. This underscores the use of the student-to-student dialogue mentioned above. Another key component of the constructivist learning environment is that it is learner-controlled or learner-centered. The instructor is the manager and facilitator of the learner-defined environment; the learner is the builder of knowledge.

John Dewey

John Dewey is an American philosopher who did most of his influential writing and thinking about education in the first half of the 20th century. He emphasized the importance of experience in the teaching and learning environments, and he envisioned the role of technology in customizing learning for the individual. Dewey foresaw an active and collaborative student experience that, almost a hundred years later, we finally have the tools to implement.

Dewey emphasized the unique and individualized nature of interaction in the learning experience. He believed, as do many cognitivist theorists, that new knowledge is built upon prior knowledge and that experiences are unique to every learner. Dewey promoted the active participation of the learner in defining the learning environment, and he conceived the instructor as facilitator.

Key Thought and Quote

Dewey focused his ideas on the aims of education: the development of reflective, creative, responsible thought. In his 1933 treatise, Dewey said, "We state emphatically that, upon its intellectual side, education consists of the formation of wide-awake, careful, thorough habits of thinking" (Dewey, 1933/1998, p. 78).

This quote captures a primary essence of Dewey's thinking. In this single sentence, Dewey sets forth one of the ultimate goals of education.

Implications for Teaching and Learning

A key idea presented in Dewey's work is that interaction and continuity are two core characteristics of effective teaching and learning experiences. The interaction characteristic highlights the importance of the dialogue and communication underlying learning; the continuity characteristic emphasizes that the individual learner must be viewed as the key design element. In other words, we must design instruction so that learners can effectively build on what they know so they have the resources and assistance to learn or, in Vygotsky's words, to navigate the Zone of Proximal Development.

Malcolm Knowles

Malcolm Knowles was among the first to bring the concept of andragogy, or the study of adult learning, to the attention of American educators. Andragogy assumes that the strategies used to teach an adult differ from the strategies used to teach children. From the andragogical perspective, the adult learner is self-directed and desirous of a very active learning environment, including actual experience to the extent possible. In adult learning environments, which include all of higher education, the instructor is viewed more as a facilitator of the teaching and learning process and less as the sole or primary source of information.

Key Quote

> Andragogical practice treats the learning-teaching transaction as the mutual responsibility of learners and teacher. In fact, the teacher's role is redefined as that of a procedural technician, resource person, and co-inquirer; more a catalyst than an instructor, more a guide than a wizard. (Knowles, 1980, p. 48)

Implications for Teaching and Learning

Knowles' philosophy strongly supports the current move away from a focus on teaching to a new emphasis on learner-centered programs. The entire movement toward active and collaborative learning is supported by the theories of adult learning. The philosophy has the following implications for instructional design:

- Learners participate in setting their own objectives. This encourages active and customized learning.
- Student-to-student dialogue taps into the current and expanding knowledge of most working and professional adults.
- The role of the faculty as mentor, manager, and facilitator is dominant. The students prefer a focus on problem-based learning, with help as needed.

Instructional Design Principles: Part III

With the constructivist theory, three additional basic instructional design principles arise:

- Design for continuity of learning at the individual level by providing options for students who are learning core material and by using well-structured content.
- Design for interaction. Include a balance of the dialogues between faculty and student, student and student, and student and learning resources.
- Design for student goal setting and decision making. Design a Web learning environment that puts the students in charge and makes them responsible for learning a set of objectives and skills.

Building an Active Learning Environment

A key component of each of these theories is learner interaction with the learning environment. Whether responding to stimuli, processing input information, or building knowledge collaboratively and constructively, the learner is an active participant. Teaching strategies that include interaction and collaboration are not generally the norm in today's higher education programs. The traditional and comfortable pedagogical model of the instructor as a predominant source of information has hindered the incorporation of interaction beyond dialogue between the instructor and the student.

The opportunities for interaction in an online environment are greater simply because time limitations and physical constraints do not exist. Today's technology can facilitate the three forms of dialogue. Moore and Kearsley's notion of participation versus presentation nicely sums up the faculty perspective of the new pedagogical model. Moore and Kearsley (1996) state that "interactive teaching is really a mental set that requires teachers to think about inducing knowledge rather than instilling it, . . . asking questions rather than giving answers, . . . focusing on student participation rather than the teacher's presentation of information" (p. 133). Today's ideal learning environment engages the learners and recognizes them as having the potential to be masters of their own learning. Under this model the instructor becomes mentor to the student, serving as content consultant, motivator, and contextual integrator, as well as a leader and manager of the learning experience.

Implementing an interactive pedagogy in the Web environment enables faculty and students to use their imaginations to move beyond the constraints of the traditional classroom. It requires using sound instructional design principles that focus on the learners' characteristics and the objectives of the course. And it also requires creativity to design meaningful experiences in a new context using a broader set of pedagogical strategies.

During a keynote speech at the 14th Annual Conference on Distance Teaching and Learning in Madison, Wisconsin, Elliott Maisie conjectured that perhaps one day learning would "be like air." With the new Web learning paradigm, we can come closer to that reality. Learning no longer has to end when the student leaves the classroom or closes the book. Learning can be a continuous, natural, lifelong process.

CHAPTER 4
ENVISIONING, PLANNING, AND IDENTIFYING RESOURCES

Overview

This chapter begins the "how to" section of the book. The first part of this chapter describes a set of decisions that faculty need to make before launching a project to move a course to the Web. Faculty will want to consider these questions:

- What kind of Web course do I want to design and develop?
- What course or sequence of courses would attract students if offered in the more flexible environment of the Web?
- What tools and resources are needed to support this project?

In this chapter, we also address questions that department chairs and deans may want to consider:

- What resources should all faculty have in order to support effective use of the Internet and the Web for teaching, learning, and research?
- How do I effectively support the first set of Web course projects?
- How much time for design and development do faculty need?
- What technical infrastructure needs to be in place at the faculty level, the department level, and the college level?
- What institutional policies need to be in place?

Two levels of decision making can help guide the design and development of a course on the Web. These decisions segment the planning tasks and make the process more manageable. Many times we just want to "get started." Sometimes this approach is best, but planning makes avoiding the potholes easier and helps to create more reasonable expectations. In fact, that might be the most important outcome of this chapter–helping to manage expectations about what *can* be done, how *quickly* it can be done, with what *resources* it can be done, and *where* Web course models of delivery fit in the institution.

In addition to planning, this chapter also provides examples of types of faculty support and training programs, as well as ways of identifying and estimating resource needs. This is a readiness chapter, designed to help you envision how to plan for moving teaching and learning to the Web environment. This chapter will help you to determine if you are ready, if your institution is ready, and if your college's technical infrastructure is ready for a course on the Web.

Decision Layer One: Envisioning a Course on the Web

The first step in the preparation phase is the visioning step. What does it mean to have a course on the Web? Ask yourself, "What kind of a Web course best suits my students, the content, and my teaching experience? What kind of Web course fits the image and context of my institution?"

The phrase "course on the Web" means something to almost everyone, but it can conjure up very different images in the minds of academic decision makers, legislators, college presidents, and deans. If we hear a technically experienced faculty member, say, "Oh, I put my EXE 1401 course on the Web last weekend," what does that mean? Some people may expect that all faculty can do this, and that the entire course is on the Web. Often, however, only a few documents, such as a syllabus, bibliography, and course calendar are on the Web, and some of us may feel we will need a lifetime to put these few documents on the Web!

Managing expectations is difficult, but considering the three major types of Web courses may help:

- A **WebCourse** is available anywhere, anytime.

- A **WebCentric** course shifts the focus from the physical classroom to the Web as classroom.
- A **WebEnhanced** course looks a great deal like a campus course but is strengthened by use of the Web.

In addition to these three types of Web courses, WebPresence describes a course that includes Web activity. While not a Web course, WebPresence content is very similar to what is now included in the traditional printed course catalog. All four types of courses are described in the following paragraphs.

WebCourse

A course that is truly and completely a WebCourse can be accessed anywhere, anytime via the Internet and a Web browser. The times and places for interaction and communication are flexible and generally asynchronous. There are few, if any synchronous meetings. Any course today that is fully available on the Web generally makes use of one of the popular Web browsers, and the course experience begins and ends on the Web. All instructional strategies are planned and executed around the communication capabilities and content resources available on the Web.

The primary characteristic of a WebCourse–that it is fully available on the Web–means that the faculty member teaching the course and the students taking the course can participate from anywhere in the world. This also means, generally, that location-based activities such as class meetings or gatherings at physical seminars or conferences are not required.

Many distance learning programs make use of a slight variant of the WebCourse by focusing on students within a geographic area that would enable students to gather for a one- or two-day event in conjunction with a course. But the idea of a globally available WebCourse includes no requirement for students to gather physically anywhere.

Another feature of the complete WebCourse is that it makes significant use of Web technology and Web applications to support the teaching and learning that make up an educational experience. A WebCourse uses electronic mail, chat rooms, bulletin boards, and online conferences to support meaningful dialogue and social communication between and among participants, including faculty and students. The true WebCourse also uses Web applications to support the use of electronic resources such as databases, simulations, current news resources, course book sites, and digital libraries. These tools and resources help support discovery learning by individual students and among groups of students. The use of all these tools supports the creation of a learning community.

WebCourses can be cohort based, involving a group of students who stay together through a series of courses. WebCourses that are part of a series of courses are best if they are cohort based because the community and the relationships created during one course can continue and deepen during subsequent courses.

Many distance courses design "gathering" activities into the program to enable students and faculty to bond with each other in a learning community. Communicating with a person may be more comfortable in the digital environment if the participants have met and talked in physical space. The online synchronous and asynchronous communication activities support both social and intellectual networking and bonding. On-campus graduate programs often use these same social gathering strategies. For example, many intensive MBA programs have beginning and ending weekend socials that include spouses.

WebCentric Course

A WebCentric course has made the paradigm shift away from the classroom as the primary site of organized instruction. As with WebCourses, the WebCentric course experience is likely to begin and end on the Web. The faculty member introduces the course on the Web and specifies what is to be done and learned, and with what resources, through Web communications. Testing and evaluation can be accomplished with examinations, projects, and reports. Like the WebCourse, the WebCentric course makes significant use of Web technology and Web applications to create an online community for teaching and learning.

With the WebCentric course the center of instruction shifts from the classroom to the Web. However, a WebCentric course may have a series of scheduled synchronous meetings, possibly on campus or at a hotel or conference center. To meet the needs and convenience of working professionals, however, the length, frequency, and the content of the class sessions may be quite different from traditional on-campus courses.

Synchronous gathering activities for a WebCentric course generally take less than one-third of the class time. Classes or meetings of a WebCentric course may total between 16 and 24 hours. This contrasts with the typical 45 hours of meetings, usually held in one to three hour weekly sessions over a 15-week semester. A WebCentric course may have one to three meetings, but each meeting may be five, six, or eight hours long. Class time is concentrated, reducing the number of times students must gather in a physical space.

WebCentric courses can also be cohort-based, and can benefit from being so, but since they include more physical meetings, the cohort is not as critical a design factor. WebCentric courses may seem to be available only within a fairly limited geographic area, but this is not necessarily the case. Working adults will often travel farther if a particular program is available in a format that requires less frequent travel. WebCentric courses may include use of other gathering events such as intensive location-based launching activities, weekend seminars, and celebratory events. Depending on the frequency and length of class meetings, WebCentric courses can look a great deal like regular campus residency courses with heavy reliance on Web technology and tools.

WebEnhanced Course

A WebEnhanced course, sometimes called a Web Lite course, uses the Web to support a traditional campus course. Faculty use Web technology to present the usual course administration components such as the syllabus, bibliography of resources, course and project requirements, and project consultation. The Web is used to support the faculty-to-student dialogue and communication, often supplementing office hours with e-mail communication and interaction. The Web also provides access to content and dynamic resources easily available online.

Designing, developing, and delivering WebEnhanced courses can be an evolutionary step for many faculty, removing the dependency on paper-based and phone-based materials and on synchronous meetings and communications. A WebEnhanced course can help faculty members migrate from a dependency on a lecture mode of content presentation toward more interactive and collaborative learning. It can be an evolutionary step away from the current classroom-centric model and toward a WebCentric course. This can be an effective change strategy for both faculty and administrators. Moving to a WebEnhanced course provides a transition step from traditional models of classroom learning to the newer models of information age learning. If this transition is done over time and with good infrastructure support, it can make the paradigm shift less costly. This is a good strategy if time and planning are available to support it.

If faculty members want to experiment with technology, the best choice is probably a WebEnhanced course. Moving to a WebEnhanced course is an attractive, low-cost strategy, but it is only "almost free" from an institutional perspective if this strategy is used by technologically savvy and experienced faculty with departmental resources behind the project. For most faculty, deciding to develop a WebEnhanced course requires a realistic look at the time and the resources needed to use this strategy effectively.

WebPresence

Developing a WebPresence for a course is much like creating a flyer or a brochure about a course or creating the description that might go into a college catalog. Some schools require that all course descriptions be available on the Web; such descriptions often include information about the course, instructor, requirements, and prerequisites for the course.

A 1997 initiative at UCLA promoted the project goal of "a Web page for every undergraduate course" in the College of Letters and Science (Young, 1997, p. A21). Affecting about 3,000 courses, this effort acknowledged the growing importance of the Web in instruction. UCLA officials believed that they were the first to make Web pages mandatory across an entire curriculum.

At UCLA, faculty choice about when to adopt this new technology disappeared; faculty needed to adapt to this requirement immediately. UCLA supported the faculty by hiring 60 to 80 technology consultants, most of them students, to construct Web pages and teach professors how to use them. Also, the faculty and their consultants used a Web course management template, WebCT, to create a WebPresence using the basic information about a course such as meeting time, course description, and syllabus.

Faculty received additional help from an annotated collection of links to Web sites with related content. Over time, faculty are also being encouraged to add readings, slides, audio and video clips, links to related Web sites, and other resources that will help their students. A discussion area appears on every Web site, letting students chat with each other and with their professors. With these additions, Web sites start to look more like WebEnhanced courses. More information about this program is available on the university's Web site, www.college.ucla.edu.

Another significant point about this initiative is that relatively few UCLA faculty had previously created Web pages for their courses. Estimates indicated that about 6 percent of the university's humanities courses and 20 percent of science courses had course Web sites. Although 6 percent is low, 20 percent exceeds the normal acceptance point of the adoption of new innovations.

Envisioning the Outcome: One Course, a Series of Courses, or a Degree Program?

When we look at some of the recommended time requirements and resources for building courses on the Web, we become more aware that faculty time, skill, and effort represent a serious commitment of resources for a college or university. Thus, it is wise to plan for the directed use of these institutional resources toward courses that are part of a larger goal. If the course is to be part of a collegewide effort, the choice of a WebCourse, WebCentric, or WebEnhanced course project will be part of a much larger planning process.

In Decision Layer One, a faculty member needs to ask questions about the larger context for the planned Web course. Is this course on the Web going to be an isolated pilot project, or is it envisioned as part of a larger department or college program offering? For example, will the course be part of a certificate program that students will want to access away from the campus in a flexible way? Or will it be part of a redesigned core sequence of courses mostly for campus-based students? Will the new plan include delivery to a large percentage of off-campus students within a two-, three-, or four-year window?

The type of Web course that faculty will develop, if well funded, will be determined by factors much larger than an individual faculty members' preference or, indeed, individual faculty readiness. The faculty in the program, the available resources, and the overall program and college goals will influence decisions about the course.

A program goal might be updating courses that form a concentration within an existing degree program or offering a new certificate

Worksheet for Planning and Envisioning Courses on the Web: Decision Layer One

Name: ______________________________ Date: ______________________________

Discipline Focus: ______________________ Department: ______________________

Institution: ________________________

Scenario: *You are a faculty member interested in moving forward with the use of technology in designing and developing courses that make significant and effective use of the Web. Answer these questions as a way of recording what you think you would like to do with one or more of your courses.*

1. Record the course or courses here:______________________________________

2. If these courses are going to be part of a larger set of courses or a program, record the name and size of the program here.

________________ Name of program ________________ Number of credits/courses

3. What type of course on the Web do you envision?

_______ WebCourse: Fully available anywhere

_______ WebCentric:Central focus of the course is on the Web; flexible, fewer synchronous meetings

_______ WebEnhanced: Enhanced campus course

_______ WebPresence: Provide information about the course on the Web

4. Where does this effort to put a course on the Web fit within your department's plans?

_______ A single pilot course

_______ Part of a certificate program (3 to 5 courses)

_______ Part of a graduate degree concentration (3 to 5 courses)

_______ Part of an undergraduate major or minor (5 to 7 courses)

_______ Part of a full master's degree program (10 to 16 courses)

5. Where will the students be? How often will they be there?

_______ Will the students be on campus regularly?

_______ Will students meet synchronously in the same physical location for 16 or more hours?

_______ Will the students be within a single time zone?

_______ Will the students be across multiple time zones?

_______ Will campus facilities be needed to support this class? If so, identify them:

6. Who are the students? Why do they want this program? What do you know about these students? Do they all have easy access to the technology?

_______ Working professionals who want to upgrade skills

_______ Working professionals dependent on a new certification requirement

_______ Lifelong learners

This is what you know about these students.

____

____

____

____

program for upgrading skills of working professionals. WebCourse or WebCentric certification programs might be an excellent fit for students who are employed but need to update or enhance their skills.

Beyond the Course Level

Just as faculty need to think about the larger context of degree programs, program leaders, department chairs, and deans also need to think about the larger context of the mission and image of their institutions. Many colleges are creating distance learning program committees to examine their options for distance learning.

Ideally, decisions about moving courses to the Web should be made in the context of the mission of an institution and its goals for the next 5 to 10 years. While institutions often plan for physical infrastructure 10 and 20 years in the future, curricular and academic program planning also need to be refreshed continuously. This planning should allow for flexibility to deal with opportunities that can enhance the institution academically. The programs that are offered externally in a community and in a field reflect on the image and mission of the institution. Therefore, decisions about external outreach programs need to be carefully planned and developed.

Another important question also concerns students. One of the most common questions from students about courses on the Web is, "Is the entire program of study–such as a master's degree, a baccalaureate degree, an associate degree, or a certification–available on the Web at a distance?" Students who are place-bound are particularly concerned with the availability of the entire program of study at a distance. They want to ensure that they can complete all components of each of the courses from a distance, and that no location requirements are made in any part of the program.

The two decisions about "What kind of Web course?" and "Is this course part of a larger goal?" are very interdependent. A seemingly simple question becomes one that could impact the institution's mission, faculty, and students. The Decision Layer One worksheet is designed to assist faculty in determining the kind of Web courses to build.

Once this level of initial planning is complete, it is time to move to Decision Layer Two.

Decision Layer Two: Envisioning the Process

Planning the movement of a course to the Web also requires thinking about at least five other areas of readiness, planning, and resources. These areas, Decision Layer Two, cluster around five topics:

- Faculty readiness
- Design and development time
- Types of faculty support
- Infrastructure support
- Mission and policy readiness

In examining these areas more closely, we identify decisions that are needed about each of these items and determine a readiness level for the journey to the Web. Although everything need not be absolutely ready before starting the journey, thinking about these areas helps us discover where trouble spots might be and helps ensure that we are open to opportunities for addressing weak spots.

Faculty Readiness

Moving courses to the Web requires a set of skills and resources on the part of the faculty member. The types of skills needed by the faculty member fall into two large categories: a knowledge of technology tools and a knowledge of the teaching and learning process.

The basic types of technology skills that a faculty member needs are listed below.

- Knowledge of and competency in the basic productivity suite of software: word processing, spreadsheet, and presentation tools. Database knowledge is a plus, but not required for the first year or so.
- Knowledge of and competency in the basic uses of a Web browser such as Netscape

Navigator or Internet Explorer. This includes knowledge and use of the search engines and the ability to find and evaluate information on the Web.

- Knowledge of and competency in the use of e-mail applications and their own e-mail communication system.
- Knowledge of and competency in building and maintaining course Web sites. This skill is less common among faculty now, but the new Web course management tools and the capabilities within word processing and presentation software packages to save text as HTML files will make this skill easier to acquire.

To develop these skills, faculty must have their own personal technology tools. We used to say that faculty needed their own technology on their desktop; however, because faculty are mobile information age professionals and consultants rather than stationary professionals, we now favor faculty members owning their own portable laptops or mobile technology. While initial costs for faculty portable computing may look high, the cost reduction comes in eliminating duplicated equipment and software in classrooms, offices, and libraries. Focusing on one good portable machine for each faculty member can also provide a significant productivity boost as the tools can be available anytime, anywhere.

Faculty need help and support in learning new technology skills. The opportunity for increasing faculty knowledge about technology also provides the chance to initiate a rethinking of the teaching and learning processes and the application of this knowledge to the new paradigm. Faculty programs that integrate technology skills with fundamental communication and discovery processes of teaching and learning are generally very well received. Faculty can learn these skills through a variety of training and support opportunities:

- One-day programs can be held as collegewide or small regional events.
- Hands-on, half- or one-day programs in the specific use of the various tools is a very cost-effective and efficient way to learn.
- Brown bag lunches are good for sharing stories. If designed carefully, these lunch gatherings can also be good for a structured set of skills. One college scheduled a series of brown bag events and invited speakers and trainers for groups of fifteen faculty members on various skills and topics.
- Preconference sessions at most higher education conferences offer good opportunities for integrated learning in technology and instruction or for straightforward technology introductions.
- Tutorials that accompany many software packages are remarkably effective.
- Other computer-based tutorials and videotapes are effective and portable.

Design and Development Time

Once the decision is made about the type of Web course to be developed, the next question involves the amount of time a faculty member needs to redesign the course for this mode of delivery. Another question concerns other types of necessary resources and support. As might be expected, few hard and fast rules dictate the amount of time and resources necessary for developing a Web course.

Budgeting and planning for these steps is particularly difficult within the context of our current academic structures. When a faculty member is given the task of teaching a campus course, that faculty member is responsible for all phases of the course: design, development, recruitment, and delivery. Often, these tasks are done within the time frame of one semester.

With Web course development we need to "unbundle" the time for design and development from the delivery of the course, particularly if the course or series of courses will be marketed to a cohort of students and delivered by a faculty member other than the designing faculty member. The only exception to this is the WebEnhanced course. Because that course is an enhanced version of an existing course for on-campus students, some of the tasks of moving it to the Web can continue to be bundled with the usual course responsibilities. There is one big caveat, however; time and resources are always needed to assist faculty in this process.

To arrive at reasonable time and cost estimates, consider the distance learning program model of design and development. Many of the distance learning programs offered before the Internet became widely available were able to reduce costs by taking highly paid, highly expert research faculty out of the delivery phase of the program.

For example, during the design and development phase of the U.K.'s Open University distance learning model, faculty experts are responsible for preparing and packaging course content. When a student registers for a course, the full package of materials is sent to the student; the cost of course materials is usually included in tuition fees. The student completes the course experience by interacting with the materials and with a tutor or facilitator who specializes in course delivery. While a tutor is delivering the course, the faculty expert is often developing a new course or updating the materials of an existing course.

Based on much anecdotal evidence, plus real experience over the last 10 to 15 years of building computer-based material, we can say with some level of certainty that creating one hour of Web instruction takes an average of about 18 hours of faculty time. This time is needed to ensure that the instruction is structured and developed to be delivered independently of the designing faculty member, but the ratio can quickly produce a negative reaction on the part of faculty, department chairs, and deans. Faculty who have done this kind of work either nod sagely, having known this all along, or nod vigorously as if to say, "that's about right."

These reactions should not be surprising, but the cost consequences are problematic. If we multiply 18 hours times the current 45 hours of in-classroom lecture and discussion time, we have an investment of 810 hours to design and develop a WebCourse that can be delivered without the presence of the designing faculty member. And this only represents the time of the faculty member. If we assume some time for startup with learning technology and instruction in teaching and learning in this new environment, plus arranging for any copyright and other issues, we can rapidly approach the 1,000-hour mark for developing a WebCourse.

Although release time varies among institutions, the average amount of release time in a semester is about 198 hours. This figure assumes a 15-week teaching semester with a week before and two weeks after for a total of 18 weeks, averaging about 11 hours per week working on the course. Using these figures, the resulting 198 hours of faculty time spent on developing a three-credit course represents 25 percent or less of the faculty time needed to create a WebCourse.

Faculty have reported working 60 to 80 hours a week while moving a course from the classroom to the Web. These faculty members are usually motivated by interest, enthusiasm, and dedication. In addition, the materials being produced are not generally being used by other faculty so the designing and developing faculty member is still part of the academic delivery process. This suggests that the bundled strategy can work at some level as a way of making possible our journey to the Web. This makes the process more affordable, but it results in little significant productivity gains for higher education since very little is being changed.

This ratio of 18 hours of WebCourse development for every hour of instruction is supported by research on the design and development of distance learning programs and the development of computer-based programs. Using estimates from research done by J. J. Sparkes in 1984, Rumble (1997) shows estimates of the hours of academic effort required to produce one hour of student learning in different media forms (p. 79). See Table 4.1.

Table 4.1. Academic Work to Produce One Hour of Student Learning

Media	Hours of Academic Effort
Lecturing	2-10
Small group teaching	3-10
Teaching textbook	50-100*
Broadcast television	100*
Computer-aided learning	200*
Interactive video or CD	300*

*Requires support staff as well

Note that the number of hours listed as the amount of academic work to produce materials for one hour of student learning refers to faculty time required. The amount of time for support staff to assist in the materials development is not included in these figures. The data suggest that if faculty are going to be successful in moving courses to the Web, we need to look at how to support their effort.

Types of Faculty Support: Time, People, and Technology

The types of support faculty need for doing this work fall into two broad categories: time and technical expertise.

The most critical success factor is time. If faculty members and department chairs truly expect to have Web courses, then faculty members need time to make this change. Part of this involves the time needed to learn new tools. Time is also required to review new sources of content for a course. The Web is a rich source of content for almost every discipline, but just as a faculty members must review textbooks and journals for appropriate course content, they also need to review a portion of the available sources of digital content for a course.

Faculty members also need time to learn new Web technology and to change their ways of conducting the academic work of teaching and learning. Incorporating new methods requires time to learn the tools, time to apply them, and time to implement them. In essence, faculty must develop new habits.

Learning via the Web with technology tools is also new to students, and their questions, problems, and habits may require more time from faculty members. Obviously, as both faculty and students develop experience with new tools, some of these questions will go away. However, we can expect more tools to be introduced in the future.

A faculty member's transition from classroom-based courses to WebEnhanced courses can be supported in several ways. Time and resources for the WebCentric and the full WebCourse will be proportionally greater, but the following suggestions apply to all Web-based courses.

- Provide a semester of release time as a minimum. Two semesters of release time over the course of a year is even better. Or, consider dedicating a full summer plus a semester of release time.
- Provide time for training and learning. This can be one to two weeks of concentrated time in the summer, or a semester of release time solely for the purpose of learning a subset of skills, such as basic productivity tools.
- Provide support for changing the curriculum if necessary to use some of the new book sites now available.
- Provide funds for hiring content researchers who work with faculty members to identify and review quality learning materials on the Web. Students who have either taken the course or are majoring in the discipline can be excellent content researchers.
- Provide training in new Web course management tools that can smooth the process of the first Web course experience. These tools are not perfect yet, but a thoughtfully selected Web course management tool can be used by everyone for at least the first set of Web courses.

Worksheet for Planning and Envisioning Courses on the Web: Decision Layer Two

Scenario: *You are a faculty member preparing a plan to move a course to the Web. You are planning to do this more or less on your own time, but you need to have some support in the area of technology resources. Answer these questions as a way of identifying the resources that are essential to you.*

Access to Tools and Support During the Design and Development of a Course

1. What is the state of your own desktop or laptop technology? Is it satisfactory? Do you need a new computer? Are your storage solutions appropriate? Do you need to update your software? Do you need specialized discipline software? Do you have access to printers, scanners, and cameras? Do you need them? Do you have access to e-mail away from campus and at home?

List below the items and the cost of resources you need during the design and development stage of moving your course to the Web.

Access to Tools and Support During the Delivery of a Course

2. List items you think you will need during the delivery stage of your course, including such items as a stable, reliable Web server and Web support in case of difficulties.

3. List the training resources and time you will need to become technologically knowledgeable.

4. What other types of support are important to you? Prioritize and quantify the following items. Note that this support is highly variable and depends on the type of Web course you are planning.

________ Time ______ Amount of time
________ Content researcher ______ Amount of time
________ Web support/Webmaster ______ Amount of time
________ Web developer/graphics ______ Amount of time
________ Instructional designer ______ Amount of time
________ Editor, writer ______ Amount of time

5. It is important to develop a plan for what you will do and when you will do it.

________ Start of planning ______ Date
________ Plan complete ______ Date
________ Start of design ______ Date
________ Design complete ______ Date
________ Start of development ______ Date
________ Development complete ______ Date
________ Semester of first delivery ______ Date

6. When you are finished, what will the result look like? Be specific here about content of the Web site and the general overall resources used by the student. Would another faculty member be able to deliver this course?

- Assign Web support personnel to help faculty with the initial work of using the Web for teaching and learning.

In addition to these categories of time and people support, Web courses require infrastructure and technology support.

Infrastructure Support

Before beginning a project for moving a course to the Web for delivery, the faculty member must have support from the administration of the department or college. The Web is a new environment for teaching and learning. Just as our current teaching and learning tools of books, classrooms, testing, and grading have supportive infrastructures, the new environment of the Web for core teaching and learning processes also requires support and integration into the administrative processes of a department or college.

Common support structures for the WebEnhanced programs include Web course management templates, Webmasters, Webservers, student access programs, and training. In addition to these support structures, WebCentric courses need support for flexible meeting arrangements and facilities and for other media access such as library materials. Common support structures for the WebCourse programs include structures for marketing, recruiting, counseling, student advising, library support, and media support.

Faculty may decide to offer a course on the Web without significant infrastructure or administrative support, but doing so takes time. Some of the vendors for course management templates offer free experimental Web servers for faculty, and support from technical staff on campus can be helpful in selecting an appropriate vendor.

Mission and Policy Readiness

Since moving teaching and learning to a new environment consumes time, talent, and resources, the full support of the institution is helpful. Faculty who are willing to experiment and work in these new environments, and who are interested in helping to define and evolve these new environments, should have the explicit support of colleagues, chairs, and deans.

Major Constraining Factors

The major constraining factors for most faculty interested in moving to these environments are a lack of time, technical assistance, and moral support. Academic administrators are constrained by the need for planning, vision, and additional faculty expertise. Teaching and learning take time, and the current faculty workload supporting the traditional paradigm is fully booked.

We are seeing, and will continue to see, many alternative modes of teaching and learning emerge to meet learners' needs. We must reconfigure teaching and learning strategies to take advantage of the new paradigm and to support faculty in the process.

CHAPTER 5
INSTRUCTIONAL DESIGN GUIDELINES FOR MOVING COURSES TO THE WEB

Overview

This chapter is the design chapter of the book. If a faculty member is going to design a course for the Web, what will it look like? How will it be similar to a traditional on-campus course? How will it differ from a traditional on-campus course? What will it have in common with traditional distance learning courses? How will it differ from distance learning courses?

Guidelines for designing courses for the Web help to ensure that, as we change the environment for teaching and learning, we design quality into the new environment. We want to make certain that the Web environment is designed with sound instructional methodology and strategies.

The chapter begins by analyzing the structure of traditional courses. We describe the expectations for time and workload on the part of faculty and students and, given these expectations, what the learning outcomes will look like.

Another important design element for Web courses is the amount of "face time" or "seat time" expected of students. Web courses that rely less on classroom meetings may run counter to state requirements and curriculum policies. Strategies for interpreting and changing these requirements are also suggested.

Finally, a major section of the chapter is devoted to the process of instructional design itself. This section contains a list of ten simple guidelines for designing and developing courses that we envision as "An Instructional Designer in a Box."

What Is an On-Campus Course?

The core unit of academic planning for administrators, faculty, and students is the three-credit course. The three-credit course can be looked at in a number of ways. For design purposes, we can approach it from the perspective of student time or student competency. Another way of looking at the three-credit course is from the faculty viewpoint. How much time does it take to design, develop, and deliver a three-credit course?

From the administrative viewpoint, the question becomes one of managing space and resources for a three-credit course in return for the amount of tuition that is generated. On an institutional level, the question might be how any single three-credit course contributes to the development and maintenance of a quality institutional image.

A three-credit course typically requires 135 hours of student time. On-campus courses generally meet three hours a week for 15 weeks, for a total of 45 hours of contact time. In addition, students are expected to spend a certain amount of time working on the course outside of class. We have been asking faculty and higher education administrators about this practice for the last ten years or so, and the most common belief is that students devote two hours outside of class for every hour in class. This 90 hours of study time can be accomplished in either individual or group study and using a variety of content resources.

As we begin designing courses for more flexible environments, designing from a time perspective can provide a point of constancy and assurance that we are not changing things too dramatically.

In traditional distance learning course models, the decreased focus on time expectations is countered by a greater focus on competency, or whether or not students achieve a stated set of goals and objectives. Many faculty in traditional on-campus courses protest that their courses are not based solely on time expectations, but also require competency as demonstrated through assessment and observations.

Two perspectives for course design are worth examining in more depth. Given the difficulty of providing objective measures of achievement for all courses, many state regulations and accreditation models specify a certain number of required "contact hours" for a three-credit undergraduate course. The time-based model does have a certain amount of validity because we know that learning requires time, but regulations based on time rather than student competency contribute to outcomes only indirectly and superficially.

When we know the desired outcomes of education, and when we can measure those outcomes, we are better prepared to require that individuals pass competency tests. However, when the desired learning outcomes are a set of complex cognitive, behavioral, and attitudinal learning, we have traditionally relied on a time-based model of education with competency exams at regular intervals.

Given the difficulties of assessment and accountability in higher education and professional arenas, we often rely on a time-based experience coupled with a competency-based demonstration such as a licensing exam. In other fields, we combine a time-based experience with a set of products, such as a series of innovative research projects or a portfolio of art or writings.

This analysis points to a need for the redesign of on-campus and Web courses. We need to design instruction with the knowledge that while time for learning is necessary, time alone is not sufficient to ensure success. We also need to design instruction in such a way that we ensure a focus on the more important goals of learning. We need to design instruction by specifying a body of knowledge, skills, and beliefs that students are to learn in the specified period of time.

As we move to designing courses for the Web, a viable approach is to combine a time-based model with a competency-based model.

Designing a Course from the Student Time Perspective

If we apply this analysis to a practical situation, we can imagine how a course on the Web might look if we segment it into the expected course components of a traditional on-campus course (see Table 5.1).

Table 5.1. Example of On-Campus Course Components: Student Time-Based View

Hours	Activity
30	Time for reading and study assignments in books, journals, and other resources.
30	Primary focus is the faculty-to-student dialogue, often described as "lecturing" or faculty-led dialogue.
30	Primary focus is an individual (or group) paper or project assignment.
30	Time devoted to testing and assessment and studying for testing.
15	Time required for general administrative and management tasks.
135	Total number of hours for a three-credit course.

As we look at the types of dialogue and activity that make up a course, we see that most hours in an on-campus course are spent outside the classroom. In fact, in the preceding analysis, 45 of 135 hours are contact time, leaving 90 hours, or two-thirds of traditional campus courses, as distance learning, if we define distance learning as time a student is learning outside the presence of the faculty member. Viewed this way, distance learning only becomes a matter of varying percentages and is not so different from what we do now.

The one traditional activity that may be difficult to envision immediately on the Web is the faculty-to-student dialogue known as the faculty lecture.

The lecture has been under review in the recent past as we search for data that support and validate lecturing as an effective learning strategy for students. The pedagogical research that encourages active rather than passive learning indicates that we may need to find ways to increase student mental activity during the lecture time. This active learning movement suggests that lecturing may be effective part of the time, but that we need to link faculty talking to student learning more consistently.

As the Web develops, a myriad of applications supporting different types of dialogue and communication are emerging. One category of tool is presentation software, the tool closest to the lecture strategy. The most recent releases of presentation software packages have made putting presentation slides on the Web a very straightforward process. New improvements allow audio of the faculty member in the form of, for example, a voice-over. New e-mail packages have voice applications that allow users to send audio e-mail messages, either as stand-alone messages or as complements to written messages. The next wave of improvements in this category transmit video of the faculty member as well. Questions related to these developments ask if the lecture is a good method for the Web environment and how learning is best accomplished through a Web-based lecture.

The view of the Web course from the perspective of student time changes primarily in the amount of time devoted to independent inquiry, group study and inquiry, the types of assessment used, and the amount of time spent interacting with other students and faculty. Table 5.2 outlines student time use for a Web course.

As described earlier, the core processes of teaching and learning are the communication between faculty and students, among students, and between the students and an assorted set of content resources. Table 5.3 illustrates how a Web course might be analyzed from the perspective of the amount and type of dialogue. From a design perspective, all three dialogues are important, and a balance of these types of dialogues can contribute to effective and delightful learning experiences.

Note that like other courses, Web courses do not need to be perfectly balanced by dialogue types. Many factors affect the design of a course. The delivery environment of a course can dictate significant variation in how and when the

Table 5.2. Example of Web Course Components: Student Time-Based View

Hours	Activity
40	Reading and study assignments in books, journals, and other digital resources on the Web.
20	Primary strategy is the faculty-to-student dialogue, often described as "lecturing" or faculty-led dialogue. The tools that can be used are a mix of asynchronous online seminars with faculty, computer-enhanced presentations, faculty interaction with small groups of students, and student activities guided by faculty.
30	Primary strategy is an individual (or group) paper or project assignment.
30	Time devoted to testing, assessment, and studying for testing. This is done via self-check tests and participation in online seminars and conferences. Final evaluation can be via projects or proctored testing.
15	Time required for general administrative and management tastks.
135	Total number of hours for a three-credit course.

46

Table 5.3. Example of Web Course Components: Dialogue Focus

Type of Dialogue	Faculty to Student Hours	Student to Student Hours	Student to Resources Hours	Total Hours
Synchronous dialogue in various size groups. The tools used can be chat rooms, telephone conversations, small group meetings online or in physical places, study groups, etc.	20	20	NA	**40**
Asynchronous dialogue in various size groups. This includes e-mail and online seminars.	25	35	0	**60**
Individual dialogue (study) with content resources.	NA	NA	35	**35**
Total hours	**45**	**55**	**35**	**135**

dialogue types are used; in this environment, a faculty member may have limited control over the structuring of the dialogue.

Today, a common goal of planning campus or Web courses is achieving a community of learners. The goals and objectives of a course can be achieved in a variety of ways, so the design of a course is often based on faculty preferences and experiences with the content and students. Certain activities, such as group projects, can require individuals who are typically fiercely independent learners to interact with a group. Many of the other dialogue preferences are in the hands of the students, and rightfully so. This is a good way to accommodate individual differences.

Additionally, the very nature of a Web course will shift the balance toward student-to-student dialogue and to asynchronous dialogue. The tools for asynchronous dialogue are much more advanced and readily available than the tools for synchronous dialogue, although we shouldn't forget about the effectiveness of "old" technology such as the telephone and physical meetings for courses that are campus based.

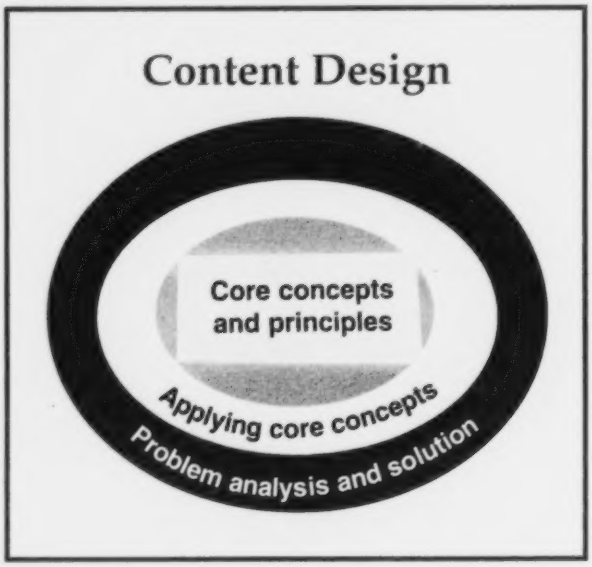
Designing a Course from the Content Perspective

From a content perspective, consider the types of content goals and objectives that make up the 135 hours of study. For every body of defined knowledge, a set of core concepts and principles need to be learned. These core concepts are the building blocks of knowledge. This is very consistent with the constructivist theory of learning. The foundation of knowledge has to be built in an area since some concepts are essential to understanding a multitude of other related concepts. One way to think about the course content from this building block perspective is to think of the content as residing in three concentric circles (see Figure 5.1).

The first circle holds the essential concepts that form the stable core of a field of knowledge. For students to learn these core concepts and principles, they need to think actively about, manipulate, or use these concepts in some way. This is also the layer in which students must memorize, repeat, rehearse, and process deeply.

The next circle of knowledge is the first application layer of the discipline. At this level of knowledge, learning begins to be applied in simulated scenarios. To integrate this layer of knowledge, students actively build and create their own networks of knowledge, linking concepts and principles to existing knowledge. This application level, for example, might be the first math problems that a child solves: simple, straightforward, and easily solved by application of a basic rule or

Figure 5.1. Content Design Model



theorem. At this level, students can solve problems by following procedures and known formulae. It can also be compared to the skills developed by following directions in a strange city. The stranger accomplishes the goal of getting from point A to point B, but can't necessarily retrace his or her steps, serve as a guide for someone else, or go from point B to any other point. This is also referred to as a novice stage of knowing.

The third circle depicts a student's active use of the core concepts and principles to solve problems of increasing depth and complexity in a selected area. At this level of knowledge, students often can and should customize their own learning and pursue their own paths of inquiry, often using materials of their own choosing.

The core concepts and principles of even a stable field of knowledge can change rapidly in our information age. We need to plan the content of our courses to allow for dynamic content changes. This is an area where the resources and the dynamic nature of the Web can be invaluable.

Thinking Outside the Three-Credit Course Boundaries

The need is emerging to think outside the boundaries of a three-credit course when we are preparing and identifying content resources to support Web learning. Rather than thinking only of building a rich environment to support one course, we in the higher education community might do well to pursue developing large comprehensive databases of resources that can support a set of related three-credit courses. New resources, such as online biology, chemistry, and math resource databases, might support both introductory, intermediate, and advanced courses. A comprehensive geography project might support general education students and majors, all with much of the same overlapping materials. Online reference materials, CDs, and databases, in addition to books, are needed for learning the basic concepts in all disciplines. Comprehensive, multilayered disciplinary and interdisciplinary databases could support many levels of content interaction and application.

Students often need realistic scenarios and situations to develop complex problem-solving skills. In many areas, this means costly simulations; in other cases, we need learning that will include internships addressing real problems. These educational needs may coincide with societal needs for additional skilled resources to solve real problems. The conservatory approach to learning has been a grand tradition in the arts; we now are at a point where we may want to incorporate regular internships and conservatories in other fields as well.

Course Hours: The Content Perspective

Table 5.4 illustrates the approximate number of hours in a course that might be devoted to the three levels of knowledge in a field: core concepts, structured applications, and unstructured complex applications.

Table 5.5 on the design of a Web course provides a look at the number of hours that might be needed to develop learning materials for a Web course. This table shows two types of Web courses and can help provide a basis for planning the amount of resources, time, and support needed for moving a course to the Web. One type is a WebCourse which redistributes the 45 hours usually spent in class meetings into 15 hours dedicated to general administration and testing and 30 hours of planned interaction in the Web environment. The 30 hours of Web interaction and instruction need to be planned and developed carefully to promote the interaction that will build and nurture a community of learners.

Table 5.4. Example of a Web Course: Content View

Hours	Type of Content
45	Core concepts and principles. Stable, predictable content focus.
45	Structured practice and manipulation of core concepts and principles in discussions, exercises. Initial problem solving. Check tests, weekly summaries. Content in this area can be dynamic and unpredictable as students attempt to integrate it into existing knowledge base.
30	High-level problem solving or projects; content can be customized to student interest. Applications to current problems.
15	General administration.
135	Total number of hours for a three-credit course.

The WebCentric course example only redistributes 30 of the 45 hours usually spent in class meetings: 15 hours to general administration and testing and 15 hours to planned interaction in the Web environment. The number of hours of teaching and learning that a faculty member needs to redesign can be significantly lower, as little as 15 hours, to take advantage of the interaction environments and the resources available on the Web. The hours, interactions, and resources can be allocated to the desired objectives of a given course in an almost infinite variety of ways.

In planning, consider that the real number of hours that need to be shifted or redesigned for a traditional campus-based course refers to the 45 contact hours. The other 90 hours are usually already in place, another good reason to focus on taking existing instruction to the Web before designing totally new courses for the Web.

Instructional Design: What Is It?

With a move toward wide-scale use of interactive strategies and materials in higher education, and the offering of courses in virtual space and time, instructional design becomes more critical to ensure quality of outcomes. However, the meaning of instructional design is not well known. Simply, instructional design is the process of designing the environment, methods, and resources for effective learning of specified goals and objectives by students.

As we start moving from traditional environments of the classroom to the Web, instructional design is critical. We have literally hundreds of years of tradition to support much of what we do in our campus-based courses. As we move to new environments, we need to refresh ourselves on the principles of learning, teaching, and instructional design. We know more about how students learn now than we did hundreds of years ago, and the Web environment gives us an opportunity to design anew, using this knowledge. This can be a very exciting time.

An Instructional Designer in a Box

Fortunately, most faculty who enjoy teaching and seeing their students succeed readily embrace instructional design principles. In instructional design, three core questions (see Fig. 5.2) must be answered before designing any instruction:

- Who are my students?
- What do I want my students to know, to feel, or to be able to do as a result of this course or experience?
- Where, when, and with what resources will my students be learning?

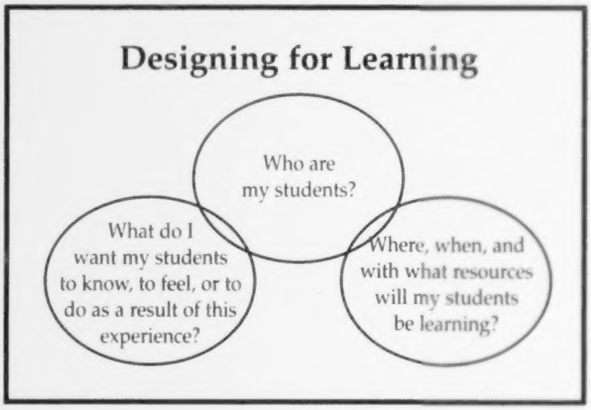
After these questions are answered, an instructional designer or faculty member answers additional questions:

Table 5.5. Example of a WebCourse and a WebCentric Course: Materials Design and Development View

Web-Course	Web-Centric Course	Faculty Work	Type of Content
60 hours	60 hours	Review and identify materials to be distributed to students and prepare assignments.	Course materials that a student is to purchase or have access to through a license or subscription.
30 hours	30 hours	Prepare directed activities for students.	Course materials that a student is to search, depending on customization and personal choice.
Note: The sections above are for the 90 hours generally dedicated to "Study time outside of class time." They can be the same for campus courses and for Web courses of all types. For Web courses, more resources will be available from the Internet/Web.			
30 hours	15 hours	Prepare materials for the Web that direct students' experience and content learning.	Course materials that a faculty member will "lecture, teach, direct, or prepare" as custom materials for the course.
0 hours	15 hours	Prepare materials for synchronous meeting times and lectures. These materials may already be developed for a WebCentric course.	Course materials that a faculty member will "lecture, teach, direct, or prepare" as custom materials for the course.
0 hours	0 hours	Dynamic response to students' needs and interests during course delivery. No advance design and development. Many faculty hours during delivery.	Course materials that a faculty member will "lecture, teach, direct, or prepare" as custom materials for students in this particular course.
15 hours	15 hours	Prepare testing and grading requirements and general course direction.	General administration and testing.
Note: The preparation time for WebCourse and WebCentric courses needs to be multiplied by the standard factor of 18 used in Chapter 4. For a WebCourse, it is 30 times 18 or 540; for WebCentric, it is 15 times 18 or 270 hours. For testing and administrative purposes, a good planning number is 18 times 15 or 270 hours. In delivery mode, more students equal more faculty time.			
135	135		Total hours for a three-credit course.

- What types of experiences and interactions will facilitate the students achieving the stated goals and objectives?
- What types of assessment tools will help to determine whether or not the students have achieved the goals and objectives? When and how should these assessment tools be used?

Figure 5.2. Designing for Learning


Designing for Learning
Who are my students?
What do I want my students to know, to feel, or to do as a result of this experience?
Where, when, and with what resources will my students be learning?

The following quick checklist is a reminder that a set of instructional design guidelines can be short and to the point. These guidelines also reinforce the importance of the design, the environment, and the support infrastructure in teaching and learning.

1. Know your students. Who are your students? What do your students already know? As constructive learners, we can only build on what we already know. Those students who have an established foundation in a field can learn more, and learn more quickly. Remember, the more you know, the more you can know.

2. Determine the goals and objectives of the course. What will students know that they do not already know? What will students be able to do that they do not already know how to do? What will students think about the content and the possibilities of the content?

3. Visualize the environments in which students will be learning. Will students have their own computers to customize and store content and interaction? Will students have 24-hour access to computers? Will students' computing resources support the latest version of Web browsers? Do students study most often while surrounded by children, while in a car, or during late night hours? Will students be doing joint projects with other students in the library, over the phone, or over the Web? Will students have their own learning resources, their own books, their own CDs, and their own subscriptions to online resources? How, when, where, and with whom will students be learning?

4. Plan the learning assessment and visualize the environments for assessment. How will students know they are learning? Will there be self checks? Will there be practice activities? Will students be evaluated weekly? monthly? In what ways will students be graded?

5. Plan for the types of learning activities that will take place. Design activities with a balance of dialogue of faculty to student, student to student, and student to resources. Design with a balance of types of resources available in print, audio, and Web format, if possible. Plan for activities that introduce, apply, reinforce, and extend concepts. Plan for activities that are controlled and led by learners.

6. Effective communication and interaction requires planning; it doesn't just happen. This statement is particularly true in the new Web environments. The different Web applications now available each have their own particular niche for use in teaching and learning. A discussion of some examples follows.

- **Mail and discussion lists.** These lists are effective tools for general communications to one or more people, and particularly good for faculty-to-student communication, such as announcements, reminders of upcoming events and deadlines, and answers to general questions. This application is also good for students to communicate with each other. The faculty member does not need to answer all the questions. In fact, students can be assigned to moderate and answer questions on a weekly basis and to direct questions to a faculty member only as needed. Some type of mail or discussion list is essential in a Web course. For faculty and students new to learning on the Web, e-mail can be the only tool used for the first Web course experience.

- **Online seminar and conference applications.** Online seminar interaction is designed for extended discussions of a focused topic. For example, in an American history course, a student might convene a seminar or conference on the beginning of the Vietnam War. In a computer science course, a conference might be held on breakthroughs in chip technology. In these applications, faculty can assume or delegate a variety of roles, and then monitor the discussion and solicit summary statements.

- **Team projects.** Simple tools, such as chat rooms, telephone meetings, and physical meetings, can support group work. Messenger services are available from Internet service providers; these services can let users know when classmates are online, providing instant, convenient, chat rooms at no additional cost.

7. All media require infrastructure. In the instructional design process, effective decisions on the use of media are among the most important. At the same time, most instruction can be delivered effectively through more than one medium. When selecting media for a course, we need to ask ourselves two major questions:

- What are the unique educational characteristics of each innovation or Web application?
- What is the minimum set of media to use to create an effective beginning teaching and learning environment?

When planning a Web course, we may be tempted to use a number of new media tools and applications. Because every type and choice of media requires access and familiarity with the media and support, the best rule when starting is simplicity.

- **Textbooks are media, too.** Assigning a textbook to students can cause numerous difficulties if your institution doesn't have a process whereby students can easily purchase books and other resources without coming to campus.

- **Web site.** Use of a course Web site requires that faculty members have technical support to ensure stability and reliability of the site. Use of a course Web site also requires that students and faculty develop habits for using the various media. In addition, a course Web site needs to be maintained over the life of a course, and possibly beyond, depending on the role of the course in the department or program. We also forget that a course Web site is not a book. Using the term "Web page" causes us to think that a Web page is like a printed page. It is not. It is a fluid medium to be nurtured and updated as needed.

- **Classroom or teleconferencing room.** Any place that the class meets is part of an infrastructure somewhere. It needs to be designed, scheduled, maintained, and accessed.

- **Online resources and databases.** Faculty and students need to have access to required and recommended materials that are online. They also need to know how to use the resources and develop skills needed for their use.

8. The more hours of teaching and learning that are designed and developed, the more time and resources will be needed. The preceding statement is the basic principle of instructional design. The instructional design of a program impacts the budget of a project, and the budget of a project impacts the instructional design.

In corporate training courses, one goal of instructional design is effective analysis of the goals and objectives of learning so that the learning program can be condensed into the shortest possible time. When instructional designers are trying to maximize learning while trying to reduce the number of hours devoted to learning, the cost per hour can increase. Well-designed materials can take more time and resources to design and develop. For companies paying their employees' time while being trained, however, the higher cost per hour of development can quickly be offset by fewer hours of employee training time. Currently, though, reducing the amount of time for learning is not generally one of the goals of on-campus learning.

For campus courses, planning should include a certain amount of time required for every hour of teaching and learning that is shifted from the classroom environment to the Web environment. Currently, the best estimate for planning is that for every hour of teaching and learning moved to the Web, a faculty member should plan to spend between 5 and 23 hours, with a standard of 18, in design and development. Building a WebCentric course and moving 30 hours of instruction to the Web takes at least 150 hours. This assumes familiarity with the tools and applications for doing this work.

9. Course delivery requirements impact design and budget. Many of us are familiar with the cartoon showing a person rolling on the floor, laughing out loud, and saying, "You want it when?" This cartoon is great at conveying the fact that the delivery time can be a critical piece of design requirements. If a program needs to be launched quickly, it will cost more than it will if availability is unimportant. Another common saying in the training field is, "Good, Fast, and Cheap . . . Pick Two!" Quality instructional programs generally cannot be built quickly with limited budgets.

In translating these guidelines to higher education campus courses, this means that if a provost, dean, or department chair wants a degree or certificate program to be launched within 18 months, a serious commitment of resources will be needed. If there is time to move the program gradually to the Web, fewer resources will be needed.

So, important questions need to be asked:

- When is the program needed?
- What human and infrastructure resources can be allocated to this project?
- What financial resources can be allocated to this project?

10. Instructional goals and objectives impact design, media, and budget. This principle of instructional design has two main corollaries. The first corollary is that complex hands-on skills programs are generally more time consuming and expensive to design, develop, and deliver than are traditional seminars or lecture courses. It is more expensive, for example, to run a lab course than to run a traditional lecture course.

A second corollary is that if the skills and knowledge to be acquired can only be taught by very highly trained and compensated individuals, the cost of the resources will be higher. This is easily seen, for example, if the skills to be taught are those necessary for success in piloting, surgery, or theoretical math courses. In some cases, learning environments need to be very sophisticated simulations, also requiring expensive, highly skilled mentors and teachers.

Additional questions need to be asked for designing instruction:

- What kinds of learning need to be developed?
- What instructional strategies will be used to enable the learning?
- What are the unique educational characteristics of the technology?

Summary Principle: Match the instructional goals and objectives to the best media that can be used within time, budget, and infrastructure constraints. This summary principle combines the instructional design principles of goals and objectives, media, budget, time, and infrastructure capabilities. Instructional design is not simple or straightforward. This principle reinforces the need for up-front planning and course design using a variety of media and infrastructure support structures. When a teacher is not easily accessible, the infrastructure and the media used must have backups.

These basic guidelines for designing instruction have been developed from the training field and from the field of higher education materials development. They contain a wealth of wisdom. As part of any project planning handbook, they should be reviewed before submitting proposals for materials development.

Models for Learning Design

Two models for designing learning can help encapsulate these ideas. The first is a model of instructional design from Tony Bates, author of many books in the field of distance learning. He was one of the founding members of the Open University in the United Kingdom. This model for designing learning is from his 1995 book, *Technology, Open Learning and Distance Education.*

ACTIONS Model (Tony Bates)

The ACTIONS model provides a practical decision-making framework for designing a new program on campus or off campus.

Access. **How accessible is the technology for the students?**

This question of access is particularly important as we begin designing and building WebCourses or WebCentric courses. If all students and faculty have their own computers and access to the Web, faculty members can assume easy, convenient, and often unlimited access. This can greatly impact the design of requirements, communication activities, and research recommendations.

Costs. **What is the cost structure of the technology?**

Any technology needs to be affordable for the three partners in a teaching and learning experience: the faculty, the students, and the institution. Questions of support and infrastructure need to be considered unflinchingly.

Teaching and learning. **What kinds of teaching and learning are required for the program goals?**

The types of goals and objectives, and the types of learning activities, need to be considered.

Interaction and user-friendliness. **What kind of interaction is enabled? How easy is it to use?**

The quality of interaction, as we have discussed, is fundamental to the dialogues that make up an effective learning community. We need to ensure that different types of dialogue and interaction are enabled and supported.

Organizational issues. **What are the organizational requirements and barriers to success?**

Delivering Web courses to students off campus requires a supplemental infrastructure to that existing on campus. Systems and processes need to be in place to recruit, admit, support, evaluate, and counsel students. These support structures are critical to the students' success. Similar support structures are also needed to support the faculty and the teaching and learning environment. We have built our campuses with a strong physical infrastructure; we now need to build campuses with strong data networks and Web infrastructures.

Novelty. **How new is this technology?**

New technology is often difficult to deploy and support effectively. Some designers of distance learning programs tend to become too conservative in their use of media by staying two or three generations of media behind. The importance of decisions regarding media selection has been greatly oversimplified by the widespread availability of the Web. Still, design decisions need to weigh assumptions about modem and network speed and the ability to use video and audio technology. However, by the time a course is deployed, assumptions may change. The question is not what is the level of knowledge and access today, but what is the level of knowledge and access likely to be when the course is delivered to the target population.

Speed. **How quickly can the courses be developed and delivered?**
Quality courses can take a significant amount of time to design and develop. The design and development of a complete WebCourse can easily take 18 months, even with the sophisticated tools that are now available. However, a WebEnhanced course can be designed and developed fairly quickly. Many distance learning courses that arrive in students' mailboxes in a "course in a box" form have taken three years to develop by a team of faculty developers. How quickly can a course be developed and delivered? It depends.

This ACTIONS model can be used effectively at the beginning of the design of a program and as a checkpoint during the design process. It is a good guide for making practical decisions about an instructional program.

ACCEL Model (Characteristics of Interactive Web Learning)

We propose another model, ACCEL, for designing teaching and learning in the new Web environment. The characteristics of the new teaching and learning paradigm on the Web will likely evolve rapidly over the next three to five years. For now, we can predict that some of its key characteristics will include a new role for the learner as an active, involved, collaborative learner, and a new role for the faculty member as a guide, mentor, facilitator, and framer of knowledge.

ACCEL provides a summary of how these characteristics of the new paradigm may interact in the new environments that are being created and in the design of new educational experiences.

Active. Learners participate in a variety of learning experiences that require thoughtful, engaged activity and guided discoveries.

Collaborative. Interactive Web course environments support and facilitate discussion and exchange between and among students.

Customized and accessible. Interactive Web learning fits the needs and requirements of many students in terms of time, access, career goals, levels of preparation, and learning styles.

Excellent quality. Courses are designed with a learner focus, enabling learners to achieve desired goals and objectives. This type of learning generally includes communication with faculty members and other students and quick and easy access to high quality instructional resources.

Lifestyle-fitted. Interactive Web learning accommodates the lives of students, affording cost-effective educational opportunities anywhere, anytime, and at a reasonable speed.

ACCEL learning experiences are nurtured within the context of a mentoring relationship within learning communities of faculty and students. The model also assumes access to a rich, information-age library with databases, electronic journal access, and interactive, high-quality instructional resources.

Chapter Conclusion

Instructional design as a profession keeps the learner, the content, and the environment in focus at all times, while applying the knowledge of how learners learn and how knowledge grows and is nurtured. We now have an opportunity to design a new teaching and learning environment that maximizes time, learning, and the joy of learning.

CHAPTER 6
STEPS IN DEVELOPING WEB COURSES

Overview

In today's higher education environment, a bundled strategy is the preferred method for preparing courses. This means that the responsibility for the design, development, and delivery of courses falls solely to one person, usually the faculty member. This has been a logical approach in the past, and is one with which we have been comfortable. Under this model, the faculty member is recognized as having the greatest knowledge of course content, structure, and instructional strategies, and is probably the person who can most effectively and efficiently deliver the course.

Currently in the physical classroom environment, paper-based technology provides the most common tools for teaching and learning. The predominant instructional strategy is the lecture, often supplemented by the use of an overhead projector. Even when presentation software is used to develop and deliver lecture presentations, the teaching environment is often very similar to that of a lecture accompanied by overhead projector presentations.

Courses that are delivered in online environments require additional design and development support. A totally Web-based course, or WebCourse, must be comprehensively planned in advance. Developing and delivering an online learning course requires more coordination than does delivering a traditional face-to-face campus course. No longer can a lecture be finalized, or developed, the night before a class. In addition, changing an online activity that is not working as planned is also difficult.

Effective WebCourses make use of a variety of media, technology, and resources, and include a variety of learner-centered instructional strategies. These strategies help the instructor manage the dynamics and interaction of the course once it is underway.

Building a WebCourse means constructing a full teaching and learning environment. In a traditional environment this might be similar to having faculty design and build the physical classroom. Because building the physical classroom environment generally is not a faculty member's expertise, it is best accomplished with physical plant construction experts. The same is true of building WebCourse environments. Expert help is highly recommended.

Fortunately, a rich array of new commercial and shareware tools is emerging that creates a digital classroom environment that is comparable to the physical classroom environment. The most comprehensive and targeted of these tools for teaching and learning are called Web course management tools. These will be discussed at length in Chapter 7.

In this chapter, we look at the kinds of expertise needed to design and develop the course materials that fill or make up the digital content for teaching and learning in an online classroom. A WebCourse, completely designed and developed well ahead of course delivery, usually consists of a course Web site that serves as a guide to direct and coordinate activities and experiences. The Web site also contains links and access to a set of digital course materials. The course features a faculty member who is the manager or mentor for the course experience. Preparing a WebCourse is usually best done with a systematic instructional design process and a team approach. This type of systematic design and development approach is especially important when the course will be offered a number of times to a large number of students and will be facilitated by faculty who did not participate in its design and development.

Systematic Team Approach to Design and Development of a WebCourse

This chapter discusses a systematic step-by-step process that you can use to construct your

WebCourse. There are as many ways of designing and building a course as there are faculty members and courses. The design and development of courses today is a cottage industry. We design, redesign, update, and change constantly, and no course is quite like any other. This is both the challenge and the drawback of our current models. In a very simplistic way of thinking, a WebCourse can cost as little or as much as we want it to cost. However, one cost impact cannot be ignored. If we spend little or nothing, the course is ephemeral, unable to be used beyond the moment or the semester. If we spend a lot of money systematically and wisely, the course might be able to be used for thousands of students over a period of three to five years, and may even be sold to other institutions. This is not unlike writing a textbook that can be used by many students and faculty over a period of time. A WebCourse can be effectively designed and developed by following the eight steps discussed below.

Step 1. Determine Your Strategy for Moving a Course to the Web: A Team Approach or On Your Own
Step 2. Select Your Course Environment
Step 3. Redesign a Current Course
Step 4. Gather and Prepare the Course Materials
Step 5. Define Unit Activities and Interactions
Step 6. Build the Course Web site
Step 7. Implement and Manage the Course
Step 8. Evaluate and Fine Tune

The first step is an important one. If a complete degree or certificate program is the anticipated outcome, some variation of the team approach is the way to go. This approach requires all the planning and funding preparation discussed in earlier chapters. So, the first part of this section describes the team approach and the people and functions needed for this type of development.

If you are doing WebCourse development on your own and are ready to begin, you may want to go directly to the second part of Step One, "Moving to the Web Without a Team." Also, the steps in the process are listed as linear, but this is never exactly how it works. Many of these steps are best done concurrently. For example, Step Three, which addresses the redesign of a course, should include the selection of a course management system. Also, since the cost and availability of materials influence the choice of materials, it is very good to plan for concurrency and iterations in these steps.

Step One. Determine Your Strategy for Moving a Course to the Web: A Team Approach or On Your Own

Chapter 4 includes an important step in moving a course to the Web–establishing organizational, faculty, and student readiness for the move. On today's campus, faculty members have a support structure in place for offering courses in a classroom. If you are one of the first faculty to move to the Web environment, the support structure on your campus may not be ready. Support for your students may not be in place, and the institution may be struggling with ways to provide support for this new environment. So, determine early if you are the kind of person who can handle a certain amount of ambiguity and be flexible in the face of certain obstacles.

Once you complete the readiness assessment and know you are prepared to plan your WebCourse, you can take one of two basic approaches to design and development. The first is the team approach, which is recommended when the course is being planned for long-term delivery "by many to many." This approach is recommended when planning degree or certificate programs as well. The second approach is the "more or less on your own" approach. This is the low-cost model, and the one to use when you have more time to transition and when you will be the faculty member who will probably continue to teach the course.

The Team Approach

If a high degree of organizational readiness exists, you may have the support of a team of individuals in the two major phases of moving to the Web: when designing and developing the course and when delivering the course. The budget for the design and development of distance learning courses should be distinct and separate from the delivery budget of a distance learning course.

Table 6.1 lists the major team members for both phases of a WebCourse project. The development team is responsible for the design and development of the learning environment, the course materials, and the production of those materials. The delivery team is responsible for the tasks associated with the effective marketing and delivery of the course. In some cases, members of the development team, such as the project manager and instructional designer, are consultants to the delivery team. This practice helps support the marketing and planning for the students who take the course. Marketing and planning for the delivery of the course needs to occur concurrently with the design and development phases.

You may be surprised at the number of team members listed. In many cases, the people on the development team may assume two or more of these functional roles; in other cases, as in the responsibilities of a graphic artist, an individual may be contracted for certain well-defined, development tasks.

The Development Team: Roles and Responsibilities

Project Manager. The project manager coordinates project tasks to ensure that a quality learning environment is produced on time and within budget. Responsibilities include creating a plan to build the WebCourse or degree program, conducting project status meetings, coordinating the production of instructional materials, and planning the course implementation. The project manager may also plan and coordinate the evaluation of the completed course during its initial delivery to students. For small projects, such as a single course or a short program, the function of the project manager might be effectively handled by a partial assignment of a faculty member or other existing personnel.

Instructor or Faculty. The instructor or faculty member is the content leader of the development team and maintains overall responsibility for the content and instructional strategies of a course.

Instructional Designer. An instructional designer provides a blueprint for the overall learning environment based on established learning theory. By using a systematic process to analyze the basic components of instruction, the designer recommends instructional strategies, assessments, media tools, and course

Table 6.1. Team Members

Development Team	Delivery Team
Project Manager	Instructor/Faculty
Instructor/Faculty	Course Assistant(s)
Instructional Designer	Web Support Person
Web Designer	Technical Support Staff
Content Researcher	Administrative Coordinator
Graphic Artist	
Technical Support Staff	

management techniques that will effectively meet the needs of the learner, the course goals, and performance objectives.

The designer begins by matching the learning goals and objectives with the characteristics and lifestyles of students and with the constraints of the delivery environment. For example, a very important design decision focuses around the choice of media. For WebCourses and other online and distance learning programs, every media decision has a resulting ripple effect because all media need to be supported. The basic principle that all media require an infrastructure must be included in an instructional designer's plan.

In an online or Web-learning environment, the designer is responsible for recommending instructional activities that engage the learner and provide opportunities for interaction with information sources such as the instructor, online resources, and experts in the field. The designer also often helps in the preparation of instructional materials. Other responsibilities might include researching online resources, developing the components of the course Web site, and evaluating the instructional effectiveness of the produced materials. In a large team in a corporate training environment, many of these responsibilities might be assigned to specialty personnel.

Specialty skills such as instructional design can be outsourced or subcontracted. Institutions with programs in instructional design or educational technology might have a ready resource of student experts that can be effectively tapped. Full-time instructional designers may appear costly, but, on larger curricula projects and full degree programs, they can produce great gains in efficiency, content effectiveness and development, and student learning.

Web Designer or Webmaster. The Web designer, or Webmaster, works with the faculty member and probably the larger department to select and design the online learning environment for a department. A Web designer may recommend the purchase of a Web course management tool. Potentially cost-effective, these tools have generally been designed and developed by faculty on college campuses and provide most of the features that beginning online instructors need. For institutions just starting out, outsourcing the hosting of course Web sites may be a wise strategy. This bypasses, at least in the short term, the need to build the Web server service part of the campus infrastructure.

The Web designer is responsible for consulting on the longer-term needs of a course or degree program and recommending and implementing solutions that will provide a framework for at least two to three years. The Web designer also works with faculty to put course materials on the Web. Constant evaluation is necessary, especially as the tools continue to increase in ease and simplicity. Web tools, just like the generic productivity tools of word processing, are evolving rapidly, but the design and development of a complete Web site for a course will continue to take time and skill.

Most colleges, if they are serious about distance learning programs on the Web, will find room in their budgets for a Webmaster. Some colleges have given up faculty lines, at least temporarily, to secure the expertise of a Webmaster. A Webmaster's skills can reap great benefits in long-term planning for structural efficiencies in a curriculum offering. Every discipline, and particularly a tightly structured degree program, can benefit from curriculum planning that identifies a core set of resources and a core set of processes that may be common across the degree program. A new way of thinking about courses is to think about clusters of courses and the resources needed to support teaching and learning in a cluster. Instructional designers and Web designers can bring expertise to this development process.

Content Researcher. The content researcher assists the faculty member by identifying content resources available in digital form. One longstanding issue in distance learning programs is how to best provide student access to required and recommended content resources. If content materials can be made available via the Web with linked journal and book excerpts, subscription book sites, databases, and other affordable digital formats, this problem can be significantly eased and student inquiry well supported. Materials in digital form can greatly reduce support costs and reduce access problems for students. In the university environment a graduate student can often serve as content researcher; in other environments contractors might play this role. Another option is to select a textbook from a publisher that has an established Web site for that content.

Graphic Artist. The graphic artist is responsible for the visual design of the course materials and Web site. Good visual design helps ensure that the instructional message is communicated in an effective and professional visual manner. The graphic artist is needed most at the beginning of a project while the "look and feel" of a course is being designed. Graphic artists are often freelancers and work on many projects at the same time. Some projects, if they are small and limited to transitioning existing programs, may not have a need for graphic art assistance, especially since some of the new Web course management tools offer design and template functions.

Technical Support. Technical support personnel are needed to help prepare the campus infrastructure for the delivery of Web courses and to help support faculty and students in their use of the campus infrastructure for a WebCourse. Ideally, students should be able to inquire about online programs, register for class, and gain access to networking, library resources, consulting and all campus resources without coming to campus. Technical support personnel can advise a team on how to make the most of what is available on campus and work around limitations or problem areas. Technical support is definitely needed for general infrastructure resources such as the help desk, access to computers, Web hosting services and redundancies, and arrangement for the use of technology for on-campus meetings.

Other Personnel. Projects designed as "by many to many" programs will probably need a person to shepherd the coordination, production, and packaging of instructional materials developed by the designer, the content expert, and other development staff into master materials suitable for instructional use and distribution. In some projects, a commercial content publisher may be a partner to whom the materials would be handed for final editing and production. In other projects, where no new materials are produced, there may be little or no need for development and production assistance. As part of the course design process, faculty identify instructional materials to be purchased from existing content producers.

In addition to the actual development work, other personnel are often needed to support the project team. Clerical support personnel can assist the project team in the acquisition of resources and general daily communication. Review personnel can ensure that the materials are accurate and complete for the specified goals and objectives. These review personnel may be other faculty, students, or other experts.

The Delivery Team

Instructor or Faculty. The faculty member manages the communication with the students; delivers the instruction; and monitors, challenges, motivates, and evaluates the students.

Course Assistant. To maintain a high level of interaction in the learning environment, a course assistant is recommended when more than 25 students are enrolled. The course assistant answers e-mail from students, facilitates online conferences, and assists in problem resolution.

Webmaster. The Webmaster assists the faculty in making changes to course Web site materials and needed enhancements to the course Web site, especially during the first, and often during the second, offering of a course. The use of Web course management tools can help reduce the amount of support needed.

Technical Support Staff. The technical support staff ensure that the course Web site is available to students and faculty 24 hours a day, 7 days a week for the duration of the course. As the model is evolving, the actual operation and maintenance of the servers for the Web sites might be in the main computer operations center. These sites become "mission-critical," and need to be backed up and "mirrored" in other sites.

Technical support personnel assist the faculty member and students in the process of course delivery. The services required, including e-mail and network access support, are often no different than those needed for technology-enhanced course delivery on campus. The difference lies in the availability of the support, which may need to be extended beyond normal on-campus hours to include weekends and evenings when online learners are working on course assignments.

Adequate technical support is particularly critical during the first few weeks of the semester when online learners are becoming familiar with new technology, setting up accounts, and navigating the maze of ISPs. It is also critical at mid-term and during the last few weeks of the semester when technology problems can impact the submission of assignments and, in turn, the determination of final grades.

Administrative Coordinator. The administrative coordinator assists in the marketing, recruiting, and admission processes of students for the course, and ensures that all the student services are in place to provide a stable, reliable, productive, and creative educational experience for students. Depending on the environment, this role might be absorbed into the normal operating business of a college or university. In fact, this is the goal since most Web courses are used by students on campus as much as by students off campus.

Moving to the Web Without a Team

The team approach is definitely the preferred strategy for development of an online course that is part of a certificate or degree program or that will be delivered many times. In the case of a single course being moved to the Web, or a sequence of two or three courses, the general expectation is that faculty members will develop the online course in the same manner they design and develop a face-to-face course: over time, as part of their normal load, and making changes from semester to semester. Many institutions provide small grants and some release time to help. However, getting to the first version of an online course is a significant commitment. How do faculty manage the design, development, and delivery of a course for the online learning environment?

This is where the guidelines outlined earlier–those for equipment, support, software, and time–need to be applied. This is also the time to clarify the expectations for the outcome of the effort. Will it be a WebCourse, a WebCentric course, or WebEnhanced course? Important questions such as, "How and for whom will the course be developed" and "When will it be delivered?" must be addressed.

Without support from a project team, the instructional quality of the first version of the online course may suffer because the faculty member must perform many of the functions or find the time or the money to have functions performed in other ways. As mentioned in prior chapters, this is generally too much work for one individual who is also maintaining a full teaching load. Most faculty and, therefore, students can benefit greatly if faculty receive release time the semester prior to teaching online. Preparing a course for the Web is much more complex than teaching a course for the first time, so additional release time during the first semester of delivery is also recommended.

With some provisos, the recommendation is made that faculty not attempt to become Web designers and developers. The faculty member can serve this role if he or she is fairly technical, is an early adopter of technology, has access to a good Web course management tool, or has a technologically adept student available to help.

Most academic computing centers also provide training programs to help faculty get started. If your organization does not provide support for faculty converting to online courses, the Web itself is a great resource. There are good sessions online or available at other institutions. Faculty can also earn certificates in "Online Teaching and Learning"; new programs of this type are being announced every two to three months.

For content materials, the Web is also a great resource. Many faculty have put their courses on the Web, and many of these courses are freely accessible. Fellow faculty in similar disciplines can be a great resource and Web sites associated with the various disciplines are also good resources. Many publishers offer book sites to enhance the use of their textbooks. Some of these are freely available, while others are fee-based.

In summary, developing your course alone is not recommended unless you enjoy learning and working a great deal on your own. Designing, developing, and delivering a quality Web course of any type is a significant, difficult, and time-consuming task. The best approach if you are doing this on your own is to examine the time requirements laid out earlier and decide how much of your course will be converted in a single semester or year. Then seek approval and recognition for these efforts ahead of time. Once you obtain approval, manage well the expectations of *what* can be done, *when* it can be done, and with *what resources* and *time commitment* it can be done.

Step Two. Select Your Course Environment

Selecting your course Web site environment is one of the most important steps in the process of moving your course to the Web. This single decision will have an impact on every other part of the process. One way of simplifying the process of moving to the Web is to use one of the existing course templates, also called Web course management systems. A sample of these systems is described in Chapter Seven.

These systems are only now beginning to emerge as commercial software with support, upgrades, and enhancements. These templates are almost the equivalent of having your own Webmaster. When you decide to use one of these systems, many design decisions are made for you. It is easier to move a course to the Web using an existing Web course management system than it is to write or design your own. Another benefit is that commercial companies are upgrading and adding features over time so that the flexibility and choices that may be not available today will probably be available later.

Consider the list in Table 6.2 when evaluating what you need in the template for your course.

Table 6.2. Desirable Features in Web Course Management Tools

- Access to current grade
- Calendar
- Chat tool
- Course backup
- Electronic mail
- Grade reporting
- Peer critique tools
- Questionnaire delivery and support
- Student biography information
- Student self-evaluation
- Syllabus
- Automatic indexing and searching
- Capability to upload information easily
- Course announcements
- Customized course "look and feel"
- Connections to external references
- Discussion lists
- Progress tracking
- Searchable and linkable glossary
- Student presentation areas
- Student management
- Timed online quizzes

Also, be sure to look at the next chapter and the introduction to a number of Web course management tools, including Web site addresses for demonstration sites.

Step Three. Redesign a Current Course

Moving a course to a Web-based environment provides the opportunity to reassess the strengths and weaknesses of a course. This is a good time to update a course, and to find ways to increase active student learning and collaboration. Table 6.3 provides a Course Redesign Guide, which is a tool to guide the development of learning objectives and the linking of each instructional component to a course objective. For example, if one of the objectives is a knowledge objective, such as being able to define distance learning, then the instructional strategy, the content resource, and the assessment process need to be linked to that objective. For skill objectives, the instructional strategies may well include demonstration and practice, followed by a student project or demonstration of that skill. The Course Redesign Guide provides a set of ideas for all three types of objectives: knowing, doing, and thinking (attitude).

This Course Redesign Guide is best used twice: once, when determining the course goals and objectives, and then again for developing activities at every unit level within each course. For example, learners may individually read a chapter from the text, complete a thoughtful response or analysis based on additional reading, and then share and discuss those conclusions in a small group of three to five peers. Or, the discussion may occur while preparing a group response. After the activity is planned, the description and instructions for each activity can be part of the course Web site.

During the process of redesigning a course, the designer should examine the course's various components. The following list may be helpful when moving to online environments, updating courses, or targeting a different group of students.

Course Goals and Objectives. What are the overall goals of the course? What instructional objectives should be achieved? What should learners know, be able to do, or think about a particular topic at the end of the course?

Type of Dialogue. What type or types of dialogues support the learning of the course objectives: instructor-student, student-student, or student-resources? When is each dialogue most effective?

Teaching and Learning Strategies. What teaching and learning strategies will be used? Based upon the type(s) of dialogue desired, several instructional strategies are available for use. For example, instructor-student dialogue can be accomplished through such strategies as lecture, discussion, mentoring, feedback, and questioning.

Technology. What technology will be used to support the course objectives? Again, based upon the type(s) of dialogue and instructional strategies selected to accomplish an objective, various technological resources are available. For example, an objective that requires instructor-student dialogue through the instructional strategy of mentoring would best be served by a strategy such as online office hours. This component may require assistance from technical support personnel in order to determine what is possible in your existing campus infrastructure.

Assessment. How will each course objective be assessed? In the past, a multiple-choice exam may have been used. However, you may now choose to have students complete a final project that demonstrates their knowledge and skill level. Or, if an objective is a change of attitude, you may want students to keep a reflective journal of their thoughts over the course of the semester. Consider creative options to assess students who are now taking an active role in their learning and who are working online.

Step Four. Gather and Prepare Course Materials

During the redesign of the course, it is a good idea to begin the search for digital and online resources as early as possible. There are two

Table 6.3. Course Redesign Guide

Type of Learning Objectives	Type of Dialogue	Teaching and Learning Strategies	Technology	Assessment
Know This type of objective is useful for core concepts and principles. It is also important for student-generated knowledge objectives. One of my objectives for my course is:	**Instructor-Student**	Lecture Discussion, consultation Group mentoring Feedback on assignments Notetaking, summarizing Questioning	Videoconference or videotape Audio Online office hours E-Mail, chatroom Online seminars Online content	Printed or online test
	Student-Student	Synchronous and asynchronous collaborative discussions and projects Study groups, online and off line	Audio, videoconference Chat, e-mail Database of concepts built collaboratively Online seminars Discussions lists Newsgroups	Project (group or individual) Journal
	Student-Resources	Readings and experiences, interviews and discussions with experts, excercises and experiences in all varieties of digital and analogue resources	Online or printed course guide Books, journals Visiting experts Digital and analogue resources (i.e. CDs, simulations, databases, tutorials)	Concept paper Concept maps
Do This type of objective is best for skill objectives. "What do I want the student to be able to do as a result of this instruction?" One of the objectives for my course is:	**Instructor-Student**	Lecture, demonstration Discussion, consultation Group mentoring Feedback on assignments Notetaking, summarizing Questioning	Videoconference Videotape, audio Online office hours E-Mail, chatroom Online seminars	Project (group or individual)
	Student-Student	Collaborative and experiential activities or projects	Audio, videoconference Chatrooms, e-mail Database of concepts built collaboratively Online seminars Discussion lists, newsgroups	Field experience
	Student-Resources	Simulations of authentic experiences, field trips, internships; interviews and discussions with experts; exercises and experiences in digital and analogue resources	Interactive computer programs, online discussions with experts, electronic field trips	Demonstration of skill Portfolio
Think This is an attitude objective. It includes building a research thought process and respect for types of knowledge, thinking, and people. One of the objectives for my course is:	**Instructor-Student**	Lecture, demonstration Discussion, consultation Group mentoring Feedback on assignments Notetaking, summarizing Questioning	Videoconference or videotape Audio Online office hours Online seminars	Summary paper Project (individual)
	Student-Student	Role plays Collaborative activities Student-led discussions	Audio, videoconference Chatrooms, e-mail Bulletin board Threaded discussions	Concept maps Field experience Student opinion surveys
	Student-Resources	Reflective journals Interviews with experts Internships Community service experiences	Online discussions with experts in the field	Case study Community service feedback

reasons for this: (1) the materials that are available online can surprise you and may significantly influence your decisions about what objectives are appropriate for your students, and (2) you may find highly desirable or essential materials that require copyright permissions and subscription access arrangements before they can be made available to your students in an online environment. The sooner the process of ensuring availability is begun, the less stress is involved. As mentioned previously, the process of design and development has many interactions and interdependencies and is not a linear one.

Step Five. Define Unit Activities and Interactions

In a face-to-face environment, interaction often happens spontaneously. We may plan a particular activity, but as it unfolds, we may change it in response to what is working and what is not. There may have been times you agonized over an activity only to change it in a burst of inspiration as you listened to the class discussion. However, spur-of-the-moment inspiration will not work as well in an online environment as it does in a face-to-face learning environment. Therefore, it is important that course activities be developed in detail before the first class session.

Planning ahead does not mean that you cannot adjust your activities. But planning ahead helps to reduce the potential confusion for learners and provides a more enjoyable experience. Changes can still be made, but sparingly.

Step Six. Build the Course Web Site

This step is when all those yellow pad notes and miscellaneous pieces of digital documents–syllabus, bibliography, project descriptions, and key handouts–can be brought together. The Web course templates and other Web applications tools provide a step-by-step procedure for putting it all online. With a Web course template, the process can be very much like word processing. But the Web templates do not do the course redesign as you move to a new online environment. This is where the real work of faculty comes in. A course Web site will be as distinctive as the course and the faculty member's philosophy allow it to be.

This is also where the power of the campus infrastructure really makes a difference. If this is part of a team project or a sequence of courses, or if you have hired a student or perhaps your own offspring, someone else may have done part of the work for the first version of the course Web site. The instructor, through discussions with other faculty members and an instructional designer, can determine the needed features and discuss them with the Web designer, who will suggest ways in which each feature can be incorporated into the course site. Although several people are involved in the process, the instructor is the one who makes the instructional and content decisions.

Step Seven. Implement and Manage the Course

After completing the first six steps, you should be ready to begin online course delivery. An excellent resource to prepare you further is *Learning Networks* (Harasim, Teles, & Turoff, 1997). This book provides chapters on learning and teaching online.

Very simply, your job is to create a welcoming and interactive environment for your students. You will want to set the ground rules, just as you do in the face-to-face environment. Set the tone for the environment and explain that the students' role is evolving, and that they will be expected to take charge of their learning perhaps to a greater extent than they have previously. Also, set up a study schedule so they learn the material in a timely manner and participate in synchronous and asynchronous activities.

Managing this course will have its distinct set of challenges based upon the personalities in the course, as does the face-to-face classroom. However, the Web-based environment also provides the challenge of perceived 24-hour instructor availability. Provide guidelines to students concerning your methods of responding to e-mail, facilitating discussion groups, and providing feedback on activities and assignments. Also, let students know who they should turn to for technical assistance.

It is also a good idea to have a contingency plan for times when the technology is unavailable, such as when the server goes down. Remember that you have alternative technology, such as the phone and fax, to use when the computer fails.

Step Eight. Evaluate and Fine Tune

Evaluation is one of the most important steps in the move to the Web. Although you have carefully planned the course, you will no doubt want to change some features after seeing the course components "in action." Your students can also provide insights into the course from their perspectives. If your organization does not provide an extensive course evaluation, you should find or create one. Companies such as E-Curriculum, <www.e-curriculum.com>, have developed evaluation tools for online courses. At least six course components should be evaluated, either by you or your institution:

- Organization of the course Web site
- Clarity of course materials
- Quality of activities
- Adequacy of technical support
- Level of communication
- Overall satisfaction with the course

A Final Word on Instructional Planning

At first glance, instructional planning may seem too time consuming to be worthwhile. Certainly the up-front development time of an online course is more time consuming than face-to-face classes may have been. However, it helps to remember that the better a course is planned, the more time will be available to handle unforeseen events that go wrong while delivering a course online. And inevitably, *something* will go wrong! You will be better able to handle it if you are not developing the course at the same time you are implementing it.

Moving to the Web, if done in an organized, systematic manner, can result in a quality course that delights the teacher and the learner, and minimizes the frustration of both. It will allow you, the instructor, to manage learner interaction and respond in a timely manner to the needs of the learner once the course is underway.

CHAPTER 7
TOOLS AND RESOURCES FOR CREATING WEB COURSES

Overview

Many tools and resources are now available to help faculty and students with the tasks of teaching and learning in the new Web environment. This chapter provides a look at two major resources that can help in moving course materials to the Web environment more quickly and easily than in the past. The two major resources that we will look at are Web course management tools and content resources by publishers.

The first part of this chapter describes Web Course Management (WCM) tools that can significantly help reduce the time and skill needed to develop Web offerings, whether the course is a WebCourse, a WebCentric course or a WebEnhanced course.

These WCM tools are very important. They are becoming as important to faculty as word processing tools, spreadsheets, and e-mail applications. These tools can help faculty and support staff with the design, development, and delivery of Web offerings. WCM tools are flexible and can be used by technologically novice or experienced faculty. They provide built-in guidance in the design and development of quality instruction, and they support the use of all three dialogues: faculty-to-student, student-to-student, and student-to-resource.

In the last chapter we looked at the types of skills and functions important in building a quality Web course. These skills are expensive and scarce. The WCM tools incorporate some of the assistance provided by an instructional designer, a Webmaster, and a Web developer. They serve as checklists for guiding faculty through the planning of a Web course by providing a wide choice of application modules that support the teaching and learning activities in a course. The capabilities are already built in; faculty can choose whether or not to use them.

We don't want to oversell these tools, but they are definitely worth consideration. The WCM tools are far from perfect, but many of these tools are quite good. Many were developed on college campuses with input from and testing by faculty. Many of these tools are also in their second, third, and fourth releases. (One of the earliest principles of technology buying was never to buy version 1.0 of anything–unless it was a groundbreaking advancement. One of us broke this rule and bought version 1.0 of the Pilot PDA software, but we all have our breaking points. Nevertheless post-1.0 releases are always better.)

Since WCM tools incorporate much of the design and development work that normally accompanies the preparation of a Web offering, they can speed the development and significantly lower the barriers to offering your first Web course.

The second part of the chapter looks at the content and structure of publishers' Web-based content resources that can enhance the usual book adoption strategy. Both WCM tools and new content Web resources can be important parts of a "do-able" strategy to get to the Web.

Web Course Management Tools: A "Do-Able" Way to Go

The Web course management applications that are now available include a whole range of tools, such as multimedia development tools, collaboration tools, and communication applications, and new Web applications are emerging almost monthly. We will focus on the two areas you will want to use when moving your first courses to the Web, but plan to keep your eyes and ears open as new tools emerge and develop.

Web Course Management Tools

In the last two years, the number and variety of tools available for helping move content and interaction to the Web have multiplied many times over! In 1995-96 we had simple HTML editors, then we had tools such as Adobe's PageMill, Claris HomePage, Microsoft Front Page, Asymetrix ToolBook, and Web tools such as Dreamweaver. Before these HTML tools, of course, there was HyperCard and also Macromedia Director for the really committed faculty! Before we knew it, the releases of Microsoft Office 97-98 had Word and PowerPoint applications offering the option of saving as HTML.

The faculty who were putting courses or materials on the Internet in the early years (1994-97) did so by using a combination of these tools plus e-mail lists, bulletin boards, and home-grown tools. Even as fewer technical skills were needed to use these tools, putting all the tools together into an integrated Web course often took more time and energy than most faculty could muster. When teaching faculty development workshops at Penn State, we encouraged faculty to start with just one or two tools and to ignore all the other hype and possibilities. The wisdom of focusing on one new tool or one new competency in one's field can be both very calming and rewarding! One can move forward without feeling panicked or stressed.

The wonder of what we have today is that the new generation of WCM tools enables faculty to learn just one tool or competency in order to reap the benefit of a comprehensive set of capabilities. In many respects, these new WCM tools are the "tools for the rest of us!"

The new generation of WCM tools covers the full range of basic course administration tools: syllabus and class information; thorough course design tools; collaboration tools; content resources; and tracking, grading, assessment, and management features.

Who Should Use These Tools?

These tools are best used by faculty who are new–or almost new–to the work of moving teaching and learning to the Web. There is always a trade-off between simplicity and flexibility. A tool that is simple and well structured does not overwhelm a user with features and capabilities. For this reason, experienced technical faculty may choose to stay with the array of tools they are already using.

Experienced faculty, however, may also review these tools and find desirable features they have not yet started using. The first WebEnhanced course we designed at Florida State did just that. We created a course Web site with basic tools, used e-mail, and then used a home-grown collaborative tool called CONSTRUE to allow students to easily post their reading reviews on the Web. After taking a new look at these tools, some experienced faculty have chosen to gradually redo their existing courses with these new tools and to use them for creating their new Web courses.

The best advice in starting out is always to "keep it simple," a good principle to follow when selecting a tool to help you teach on the Web. Pick an application and go with it. Keep your Web course simple for the first offering. Creativity and a unique personal style will gradually develop.

Another guiding principle is to use the tool recommended by the support group at your institution or by friends and colleagues. That way you have existing support for your efforts. Another tool might be a little better for your needs, but available support in the infrastructure for you and your students usually outweighs any potential advantage from the additional benefits. Often, if a specific feature is missing, the next release of the tool may provide it.

An Overview of Web Course Management Tools

This section provides an overview of some of the WCM tools that you might want to consider. We provide a brief synopsis here of some of the better known and more comprehensive tools. We also list other tools that are also being used by many faculty and may be appropriate for you or your particular discipline.

The many articles and resources available that describe and compare these WCM tools at the detailed feature level are also helpful. With technology, a good rule of thumb is to do a current search for applications and tools, since features and products change rapidly. Even the category name for these tools is still in flux. Some reviews call them WBI, for Web-based instruction tools; others call them WCMT, for Web-based class management tools; and others, as we do here, call them WCM, for Web course management tools. Whatever they are called, they are rapidly becoming important faculty and student tools.

Comprehensive Course Management Tools

A comprehensive WCM tool provides a framework or template for the three major steps of faculty work in offering a course: design, development, and delivery of the course, including tracking, grading, and assessment. Most commercially produced WCM tools also include technical support.

For the design of a course, these templates typically provide "preformed digital buckets" for all the key components of a course. The templates usually include four major categories of features. Sharon Gray at Briar Cliff College described these four categories of features in *Syllabus* in September of 1998 (pp. 18-23). See www.syllabus.com/sep98_magfea2.html.

1. Course Design Features: sample courses, course templates, and student home pages. These features help faculty get a "feel" or a sense of what a Web course might be, and they contain a template that can be copied and used fairly quickly. It is wise, however, to plan for redesign time. The Web classroom differs from a campus classroom, and what works in one is not necessarily good for another.

2. Collaboration Tools: e-mail, file sharing, bulletin board, asynchronous and synchronous discussion tools. These features help faculty and students collaborate and communicate with each other, and with experts and resources not on campus. Remember the rule of keeping it simple; choose and become familiar with one or two for the first course.

3. Course Management Features: student grading and tracking, assessment tools, and timed quizzes. These features help reduce the amount of time faculty spend assessing student progress in the course. Because of difficulties in assuring security on quizzes and exams, many faculty members design student quizzes as competency-based or practice tests, graded for completion rather than for comparison with other students.

4. Administrative features: security and technical support. These features provide assistance in using the tools, answering the inevitable questions that arise, and addressing the unpredictable and weird things that happen. Some features that protect the course Web site can make getting copyright permission easier and increase the likelihood that the principle of fair use can be applied to some of the content.

The sample course templates usually have places for these common elements of a course:

- Faculty introduction
- Syllabus
- Course description
- Course materials from the faculty member
- Minilectures
- Online or course discussions
- Required materials
- Highly recommended materials
- Supplementary materials and resource sites
- Student home pages
- Student grading tools
- E-mail, discussion, and seminar communication features

A Sampling of Web Course Management Tools

Specific tools and their vendors are listed below, along with their Web sites. The commercially developed tools described here are being used by higher education institutions, have generally been enhanced over time, and offer technical support. These tools, discussed in alphabetical order, represent a sampling of the tools now available, but many others are also serving faculty and institutions well.

Almost any of the many tools available will reduce the work required for most faculty; some tools will work better than others for some faculty. In some cases, the choice of a tool may be constrained by institutional or cost factors. If your institution has already selected and set up the infrastructure for a particular tool, do not be disappointed that you do not get to choose one yourself! Someone on your campus has already done part of the work in preparing a Web offering, so you can move on to the real faculty work of designing, developing, and delivering a course.

As you develop expertise in working with a new WCM tool, you will probably find ways to customize the environment to some degree. The important factor is to keep the goal in mind: getting your first course on the Web. Later you will find ways to mix and match many features to better fit what you want to do, and the features of the various tools will continue to improve.

Note: The Web addresses listed here are provided only as a starting point. Web addresses change, Web sites sometimes shut down temporarily or close, and Web site managers may not maintain materials at Web sites. If you have difficulty accessing an address, try using only the first part of the URL; the highest level domain name often stays in place.

Convene (Convene)
<www.convene.com/overview.htm>

Convene has been in the online tools arena since 1989, serving both the distance education and corporate training markets. The catalyst for initially developing the software was to "facilitate group communications over the Internet." Convene provides a comprehensive product that can include hardware, software, and servers. The product's tag line is "Setting the Standard in Online Education." Convene is located in San Francisco and offers a fixed cost per student per course pricing structure that "decreases as your program grows."

One interesting new project described at this site is a program at California State University at Hayward using the Convene program. Cal State Hayward is offering an online teaching certificate program, a 4-course, 18-unit program that the university hopes to expand into a 45-unit master's degree program. At this writing, the certificate program has 60 students currently enrolled, including 20 from community colleges, 15 from universities, and 25 trainers from industry and government.

CourseInfo (Blackboard)
<HTTP://www.blackboard.com>

This is an Internet company founded in 1997 and located in Washington, D.C. The company's tag line is "Bringing Education Online." Blackboard is working on a three-tier suite of products that can assist with the design, development, and delivery of individual courses, as well as campuswide integration of Web programs and tools with administrative systems. Their initial course level offering, CourseInfo, supports the design, development, and delivery of courses delivered on a server for one or many faculty members. CourseInfo builds on a course template developed at Cornell in collaboration with a number of faculty members.

The goal of CourseInfo is to support faculty offering courses either on campus or at a distance. Sample courses and a "test drive" of the Blackboard Classroom are available at the company's Web site. The Web site includes faculty testimonials from Cornell, Yale, the University of Pittsburgh, the University of Memphis, and many others. The pricing structure is server-based, meaning that the license is for the operation of one server with CourseInfo software loaded on it. Thus, the cost is faculty and student independent.

Blackboard is also working closely with the IMS project launched by EDUCAUSE, a higher education technology organization. The goal of this project is to set industry standards that support interoperability of online tools and materials. For more information on this project, go to www.imsproject.org.

FirstClass Collaborative Classroom (SoftArc)
<www.education.softarc.com/>

FirstClass software has been in existence since 1989. SoftArc is based in Toronto, Ontario, and San Francisco, California. Its users include Open University and Emory University, among many others. At Emory University, it is used by almost the full range of departments and schools within the university. Open University has been using FirstClass software since 1994, and by 1998 it was being used in over 80 of Open University's distance learning courses.

At this writing, the cost structure for FirstClass has two components, a server license cost and a per-user price. The Web site has demonstration capability and details about the current version.

IntraKal (Anlon)
<http://www.anlon.com/aboutsethtml>

Anlon Systems, Inc. was founded in 1996 by two former educators to provide faculty support software for colleges and universities. IntraKal is a WCM tool that strives to streamline the administrative tasks of education and allow teachers to focus more completely on student learning and course content. Anlon provides IntraKal either on a per-faculty pricing structure or a per-student structure. The company tag line is "Freedom to Teach." A demonstration of IntraKal is provided at the Web site.

A news release at the Web site describes an MBA degree program at James Madison University using IntraKal. Fifty faculty are expected to use this program.

LearningSpace Anytime (Lotus)
<www.lotus.com/home.nsf/tabs/learnspace>

LearningSpace Anytime is offered by Lotus Corporation, and, like other WCM tools, supports the creation and delivery of asynchronous, instructor-facilitated, self-paced learning. Some of the elements of LearningSpace Anytime, similar to other programs, are listed below.

- *Schedule.* Provides students with a structured approach to the assignments, materials, and assessments. Through Schedule, students can link to all elements required to complete the course.
- *MediaCenter.* Allows immediate and searchable access to all materials for the course as they are made available by the instructor.
- *CourseRoomHosts.* Collaborative interchange between student groups and/or students and instructors.
- *Profiles.* Helps students and instructors get to know their classmates to form productive teams and to network outside of the course.

The pricing structure of LearningSpace Anytime was not easily available at the site when a search was done. Seton Hall University in New Jersey has an extensive implementation of Learning Space, as do many other universities.

WebCT (Developed at University of British Columbia)
<http://www.Webct.com/>

WebCT was developed in the Department of Computer Science at the University of British Columbia in Vancouver, B.C. and was acquired by Universal Learning Technology (ULT) in May of 1999.

The cost structure for WebCT at this time has two components, a server license cost and a per-user price. The information at the Web site indicates that there is no charge for WebCT until the students start to use it. Other personal communication with users indicates that there is only a server license cost. The pricing structure of these tools, like the tools themselves, is undergoing constant change, and often choices of pricing models are offered.

Some of the WebCT customers in the U.S. are the University of Georgia, UCLA, Marshall University, and UC Berkeley. A list of publications about how WebCT is being used is available at the site, as is a list of independent evaluations and comparisons about similar WCM tools. This is a good place to begin searching for a list of independent evaluations.

WebCourse in a Box (MadDuck)
<www.madduck.com/>

MadDuck Technology and its suite of Web-course products and services originated with a consortium of institutions interested in building a Web-based course template for faculty. The template was initially called Course in a Box and then evolved to Web Course in a Box. As with other Web course management vendors, MadDuck is offering or planning to offer tools ranging from a single course builder to a Web course to campus integration to Web hosting. The cost structures are similar to those of other vendors.

Some of the campuses using the WebCourse in a Box include the Virginia Commonwealth, Kennesaw State University, and Garden City Community College. The company tag line is "Specializing in Web-Based Learning Environments."

Resources for Comparative Look at Web Course Management Tools

Because you will be investigating current evaluations when the time comes to make a decisions about which Web course management tool to use, we are including a beginning list of resources:

1. Course Management Systems Review. University of Tennessee, Knoxville. The beginning of a comparative look at Web course management systems, this site has direct links to vendor sites. <http://www.it.utk.edu/itc/on_line/software/manage.html>
2. Gray, Sharon. Web-Based Instructional Tools. *Syllabus*, September 1998, pp. 18, 20, 22, and 57. <http://www.syllabus.com/sep98_mag.html>
3. Gray, Sharon. Collaboration Tools. *Syllabus*, January, 1999, pp. 48, 50 -52. This review examines 33 different collaboration tools and provides a smaller list of comprehensive Web course management tools.
4. Sites provided by "Independent Comparisons of Web-Based Course Building Tools" are listed on the WebCT site at <http://homebrew1.cs.ubc.ca/Webct/wichita-state-eval.html>.
5. WebCT at the University of Georgia. <http://Webct.uga.edu/hostsys/cumrec/cumrec98.html>
6. Hazari, Sunil. (June 1998). Evaluation of Course Development and Management Tools. University of Maryland, College Park. In this paper, Sunil Hazari of the Robert H. School of Business at the University of Maryland, College Park, examines six Web Course Management tools. <http://sunil.umd.edu/Webct/>
7. University of Manitoba Feature Comparison (WebCourse in a Box, WebCT, BlackBoard, TopClass). This site also features helpful background information on Web course management tools, including pros and cons of using them. <http://www.umanitoba.ca/ip/tools/courseware/model.html>
8. SCOET/CCTT/OLT Feature Comparison (Standing Committee on Educational Technology, the Centre for Curriculum Transfer and Technology and the Office of Learning Technology). <http://www.ctt.bc.ca/landonline/>
9. UC Berkeley WebCT Adoption Summary. <http://socrates.berkeley.edu:7521/articles/Webct/NewToolsToHelpInstructors.html>

A Course Management System's Function

A well-designed WCM system addresses all the facets of the design, development, and delivery of a course. These products, at their best, will facilitate interaction with and management of students online and will also support many of the traditional classroom elements. Ideally, the tools will provide support for all faculty, from novice to more experienced users, and will evolve over time to help transform and support the new teaching and learning environment. A good WCM tool is easy to support, requires minimal administrative and technical resources, and is available at reasonable costs. The best tools will link and "talk to" the back office operations of the college.

A list of features desirable in a WCM tool has been provided. The University of Maryland evaluation also identified a set of desirable "back-end features" that includes technical support and a set of other features that might best be characterized as administrative features. You may want to consider these as you make your choice.

Back-End Features

- CGI Script Support
- Course Archive/Backup
- Database Access
- Choices of Development Platform (OS, Web)
- EXE File Support
- Java Support
- Security
- Server Type Used (Unix, NT)
- SSL Compliance (Secure Socket Layer)
- Student Data Batch Input

Other Administrative and Support Issues

- Cost and Pricing Model
- IMS Compliance (Instructional Management System)
- Site License
- Training
- Upgrades
- Vendor Partnerships

Many campuses form a review committee composed of faculty members and technology staff to evaluate the current top four or five WCM systems. Many colleges and universities have also generated an evaluation form to streamline the review process. When your campus is ready to make a more or less campuswide decision, this is a good model to follow.

In many respects, these WCM tools can be viewed as the new context or new environment for teaching and learning. This new context is very like the four walls of current classrooms. Teaching and learning require more than physical space.

Publishers and the New Web Environment

Publishers of college textbooks have not had an easy time recently. Some studies suggest that students are buying, reading, and carrying fewer and fewer books. Some faculty have embraced the strategy of custom publishing, selecting smaller books, and preparing course packs. The cost of publishing comprehensive textbooks keeps increasing, and faculty often think twice about the adoption of large, expensive textbooks.

With the advent of the Web, some faculty have chosen not to adopt textbooks at all for certain courses, choosing instead to assemble a course from other print, video, and digital materials. The World Wide Web is a new world to us all, and publishers have launched interactive divisions with the hopes that higher education would embrace interactive materials.

The publishing industry has also been undergoing transformation. There are fewer and fewer smaller companies. In recent years, a British media company, Pearson PLC, has acquired Addison Wesley Longman, Prentice Hall, and Simon & Schuster to create "the world's leading international education business." Benjamin Cummings, one of the earliest publishers of digital anatomy and physiology resources such as A.D.A.M. and Allyn & Bacon, is also a Pearson imprint.

Despite the changes in and uncertainty of media formats and pricing models of the future, industry analysts estimate that the printed and electronics education materials business will be growing at a rate of 10 percent a year for the next few years. We may not know how it will all sort itself out, but given the demands for education at all levels in an information society, the future for educational materials is likely to be very good.

Publishers' Content Resources and Tools Overview

As the publishing industry expands from print formats into multimedia and Web formats, new content models and new pricing models are emerging. This publishing experimentation is good for faculty and for students, as their choices for content access, including dynamic, up-to-date, and relevant content, are expanding. Access to well-known national and global experts is also becoming possible.

The new electronic content formats, often available as companions to well-known textbooks, are known by a variety of names. Prentice Hall calls its sites companion Web sites, Addison Wesley Longman calls them online course companions, and Allyn & Bacon calls them online study guides. These formats are supplemental to the new CD-ROM materials which are sold either individually or in conjunction with textbooks. A search of the publishers' Web sites, some of which are listed below, enables faculty members to explore how these new formats might help to support their move to the Web.

Access and pricing models vary as well. Some of these book sites are open and free, but are designed to support specific textbooks. Thus they are most useful if a faculty member has adopted that particular textbook. Most of these new online book sites share common features, such as links to other Web sites, student self-assessment resources, and instructor networking spaces.

The companion Web site "plus" option that is available with some textbooks supports some of the features found in the WCM templates described earlier, including communication, grading, and tracking tools. If you are a lonely faculty member with little infrastructure support, this can be a powerful choice!

Following are brief profiles of some of the offerings from companies within Archipelago and Pearson PLC publishing groups. Many additional publishers offer interesting choices for faculty, such as collaborative writing software and Harvard case studies. This list is intended only as a starting point to describe the different types of content resources that a faculty member might seek in specific discipline areas and for professional purposes.

Archipelago (A Harcourt Brace Company)
<www.archipelago.com>

Archipelago, a division of Harcourt, Brace & Company since 1993, is a learning technology company that specializes in the development of content-based multimedia and Web sites for higher education. It offers products of two main types: comprehensive distance learning courses and a library of CD-ROMs that can be adopted for courses.

As of early 1999, Archipelago offers four courses in the comprehensive distance learning mode: general chemistry, physics (calculus-based), microeconomics, and macroeconomics. The Web site describes these courses as providing "both the content and the context" in "modular presentations designed for asynchronous use and distributed via the World Wide Web and CD-ROM." These courses offer editing tools for faculty to customize the content, and they also provide "Internet Support Features" providing links to news articles and access to licensed CNN footage. These comprehensive courses come with Web support and technical support for course delivery.

As with most of the new publishing models, there are multiple pricing options. These programs can be purchased by individual students, by faculty as online course packs, and by consortia.

Addison Wesley Longman Higher Education Publishing Group (A Pearson Company)
<www.awl.com/corp>

Addison Wesley Longman Higher Education Publishing Group serves almost every discipline for the U.S. and international college markets. The company has major academic publishing hubs in Reading (MA), New York, and Menlo Park (CA). You can look at their book Web sites by discipline: business, economics, information systems, mathematics, statistics, and multimedia.

The Addison Wesley Longman site has an extensive list of textbooks in each discipline area mentioned. There are twenty book sites for business alone. Each of these book sites provides practice tests, computer-enhanced presentations, Web links for each topic, and updates. The book site for the textbook on multinational business finance, for example, also provides direct links to *The Economist* and to *Financial Times*.

Benjamin Cummings (A Pearson Company)
<www.awlonline.com/bc/>

Benjamin Cummings is best known for its publishing work in the sciences, including anatomy, physiology, biology, ecology, and genetics. The Web site is particularly rich in these disciplines and includes descriptions and samples of the book sites that serve as companion online sites for Benjamin Cummings textbooks. One of the biology book sites, Campbell Biology Online, features animation, activities, contests, and links to some of the "best biology-related sites on the Web." Many of these sites are accessible without charge. A special instructor's lounge features interviews with such experts as E. O. Wilson.

The Biology Online site also provides access to a series of Biology Labs Online, a set of online learning simulations produced by a collaboration between biologists throughout the California State University System, the CSU Center for Distributed Learning, and Addison Wesley Longman. A precursor to these online labs is the original and very popular Virtual Fly lab. The Biology Labs Online program is planned as a series of nine simulations that can be used to support the biology lab experience. More information is available at the Center for Distributed Learning (CDL) site, <http://www.cdl.edu/html/biology.html>.

The pricing models for the textbooks and related online sites generally require the adoption of a textbook. The companion source material is then available by a subscription which comes with the purchase of the textbook. Other purchasing models are also being evaluated, including individual purchasing.

The popular A.D.A.M series for anatomy and physiology has its own Web site at <http://education.adam.com/products/p_edu.htm>.

Prentice Hall (A Pearson Company)
<www.prenhall.com>

Prentice Hall, established in 1913, is now part of the Pearson Education publishing company. Prentice Hall has strengths across major segments of higher education textbook publishing. The Web site features a companion Web site gallery listing the imprint's major textbook areas of business and economics, education, careers, technology, engineering and computer science, humanities and social science, science and math, and professional and technical reference.

The development direction that Prentice Hall is pursuing appears to be similar to that of the other publishers: providing companion Web sites for their most popular textbooks. These companion Web sites provide online study guides, reference materials, communications tools, and faculty resources.

Following the links, for example, of the chemistry series by Brown/Lemay/Bursten, reveals the first two chapters of the password-protected Central Science Live site, a list of general Web resources for chemistry, and a list of Web resources for the first chapter. A section on visualization tools also links to demonstrations of molecules.

Thoughts on Content Web Sites: Digital Twins and Icebergs

Content Web sites offered by publishers are rapidly evolving. These Web sites started out as digital twins of the analogue textbook and resources to help faculty deliver courses. These faculty resources often consisted of overheads, computer-enhanced presentations, test banks, student problems and challenges, and other planned activities.

Companion book sites evolved by adding digital resources such as interactive tutorials, animation, simulations, and real audio and video content. The materials in this second phase shared the characteristics of book publishing, in which materials are developed, reviewed, edited, and packaged for thousands of students. Book cycles were well defined, with new editions being released every two or three years. Similar waves of development may occur in this new medium as well.

The Web sites are now evolving to the third phase as they become increasingly dynamic. They have links to related Web resources, hosted events, contests, and contributing editors. The new sites also offer virtual spaces for faculty networking. Rather than waiting for annual conferences, for example, faculty who are teaching in similar disciplines can network and share resources online.

These evolutions will soon lead to another, more revolutionary mode of content publishing: sharing content, materials, and events across the usual course boundaries. Rather than a database for one general geography course, for example, a geography Web site may have components which are available for faculty who are teaching any one of a multitude of related courses. Rather than course resources, we will have discipline resources that provide a rich environment for motivated students and an abundant environment for students who only want to do the basics.

Future Directions for Content Web Sites

The current publisher Web sites are like the larger Web; only a small tip of the available resources can be seen with a quick glance. We are accustomed to taking quick measure of textbooks, but taking a quick look at the various book sites is not so easy since only a small portion of the richness of the content can be easily seen at one time. These sites are like icebergs, mountains, or Webs of content, accessed only a node or a window at a time. While these book sites can save time, they can also use time as well. Rather than spending days, weeks, or months examining the various Web sites, this may be a time simply to adopt the Web site of the textbook that best fits your course for now and use it for a while. As faculty and students use the sites, a more valid decision can be made. The best piece of advice here is to do something. Get started, but don't sign multiyear contracts!

What Next for Content Web Sites?

Future Web sites are likely to include the following features:

1. ***More content organization by topic than by course.*** When this happens, we will need tools to help identify levels of content, types of learning objectives and associated content resources, and relevant activities and assessments.

2. ***More synchronous and current events, and greater access to experts, student networking, and faculty networking.*** Content resource sites will begin to leverage daily and weekly news events to provide relevancy to learning. Experts will be available remotely, and their comments and interviews will be archived and searchable. Some of these capabilities are already in place, with students monitoring and participating in a series of major national events. These events will help to stimulate the networking of faculty and students.

3. ***Resources that are mixable and flexible by faculty and students for interdisciplinary programs.*** It is likely that book sites will evolve into larger databases of resources in response to more interdisciplinary programmatic requirements and the increased use of electronic materials. Value will be added to teaching and learning by publishers with related and complementary resources that make the barriers between the "courses" and the "textbooks" more malleable.

As the pace of information development continues to accelerate, the importance of learning core concepts and principles, and learning how to apply those core concepts in a discipline, will be the keys to learning how to learn and to lifelong learning. Publishers may want to segment and package their resources into three layers of content, including core concepts and principles, application of core concepts, and problem analysis and solving.

4. Pricing models of all types. Pricing access to the content will be in flux for some time, but the availability of multiple options for access and pricing, including individual subscriptions, will be constant. Students and nonstudents, for example, may want to access a biology or international finance site, whether or not it has been recommended by a faculty member.

5. Expanded role in education by content publishers. If faculty move courses to the Web and adopt the textbook and other resources provided by the content publishers, it is possible that the increased use of materials developed by publishers could enhance the productivity and accountability of higher education. Faculty might be able to spend less time designing and developing their courses. Students might have access to multiple and interactive ways of learning difficult content. However, if the materials are expanded, they may cost more; therefore, the cost to the students will increase.

Final Thought

The primary value of an educational experience, in addition to the certification, is the actual learning, and learning is best facilitated by the structure and organization that a course or a well-designed educational experience brings. Enabling students to learn basic concepts, important relationships, and processes without having to rediscover all foundational knowledge is a goal of higher education. Therefore, the well-structured materials and tools to help this happen will always have a role.

What is not certain at this time is the format of these well-structured materials. We do know that content needs to be structured so we can teach and learn in pleasurable and effective ways. Faculty and content publishers will be defining new roles and relationships in the future.

CHAPTER 8
WEB COURSE MODELS

Overview

The first part of this chapter describes some of the early efforts at creating Web courses. In this case, early means only a few years ago, the period from 1994 to 1996. In Net Time, we get a new generation of technology every 18 months, and a host of related applications soon follow.

This chapter looks at models of Web courses representing each of the three basic types: WebEnhanced, WebCentric, and WebCourse. Each of these courses is described briefly in terms of content and time.

To illustrate these types of courses in action, this chapter also includes stories from faculty who are implementing these Web course models on real campuses with real students. These faculty describe how they developed their Web courses and discuss some of the issues they faced on their journey to the Web.

Computer-Based Courses

Early in this book, we marveled at how quickly the Web has become part of our lives. The ease and simplicity of reaching out and interacting with anyone, anywhere is in part driving our enthusiasm for the Web. However, designing and developing good content that is essential for good teaching and learning has always been costly. In the 1980s, when full sequences of computer-based lower division courses were being developed, the cost of a three-credit course averaged about one million dollars. This covered all aspects of the development process, including an advisory board, content selection, course design, development, and testing. Recent discussions with colleagues in distance learning and publishing confirm that the numbers have not changed significantly.

The reality of the time requirement for significant Web-based content development took hold during the period between 1995 and 1998. At this point, the Innovator wave was over and Early Adopters were being asked to put courses on the Web. Creative faculty and commercial vendors came forward to help.

Developing Content for the Three Web Course Types

Table 8.1 estimates the amount of packaged content and the amount of dynamic course material in traditional and Web-based courses. Estimates of the amount of personal choice or customized content and dialogue and interaction are also provided.

As we look at the ways of describing courses, we can easily see that the difference between a traditional distance learning course and a traditional campus course can be described in the varying amounts of a course that are "prepackaged." In the case of a distance learning course, almost 100 percent is prepackaged. The distance learning model has the course materials boxed and planned ahead of time. A traditional campus course, on the other hand, is generally less than 50 percent prepackaged. So to move a course from the traditional campus mode to a totally remote, asynchronous WebCourse can be daunting in terms of time, skill, and resources.

As distance learning courses begin to incorporate Web technology and as more campus courses are moved to a WebEnhanced model, these differences start to diminish. Both types of courses may shift closer to a WebCentric model, for example. As these models evolve, we need to move forward wisely so we retain the benefits of all distance learning models.

A look at these types of courses from the point of view of what can be available to students in the "anywhere, anytime" mode may be helpful. Table 8.2 shows the distance learning model at the top and the campus course at the bottom, with the three types of Web courses in the middle. The two columns show the relative percentage of teaching

Table 8.1. Relative Percentage of Developed and Dynamic Course Content Elements

	Packaged Developed Materials	Dynamic Materials	Personal Choice Materials	Dialogue and Interaction
Traditional Distance Learning Course	92% to 100% Delivered in a course package	0%	About 5%	About 3%
WebCourse in Distance Learning and Campus Programs	70% to 80% Prepackaged content with Web communication	5% to 10%	10%	5% to 10%
WebCentric Course	55% to 75% Adopted book plus Web content	5% to 10%	10% to 15%	15% to 20%
WebEnhanced Campus Course	50% Adopted book plus Web content	15%	20%	20% (Dialogue often increases beyond 100%)
Traditional Campus Course	35% Usually an adopted text	20%	20%	25%

and learning that requires synchronous meetings in physical space.

Looking at courses from this perspective, we may be surprised to see the small difference between a traditional campus course and a WebEnhanced campus course. A faculty member teaching a traditional campus course can change a course to a WebEnhanced course by making changes to only 10 percent of the course content and interaction. The easiest way to do this is by making three major changes:

- Use the Web for distributing all the documents for a course

Table 8.2. Relative Percentage of Course Content Elements that Are on the Web

Type of course	Content and interactions using the Web and other asynchronous resources, such as books	Synchronous requirements/same physical place
Distance Learning	90% to 100%	0% to 10%
WebCourse	90% to 100%	0% to 10%
WebCentric	75% to 90%	10% to 25%
WebEnhanced	65% to 75%	25% to 35%
Traditional	50% to 65%	35% to 50%

BEST COPY AVAILABLE

- Use the Web or the Internet for e-mail communication
- Use the resources of the Web for student learning

If this is so easy, why don't more colleges require all faculty to create Web sites for their courses? Institutions that have declared a new context for teaching and learning by requiring that all students have 24-hour access to computers are close to this requirement. However, this type of change often produces unexpected or unforeseen consequences.

As we have seen, changes toward a WebEnhanced course mean a great deal in terms of faculty skill and knowledge, and accessible, portable tools. Such changes also have ripple effects in increasing the requirements for an effective teaching and learning infrastructure.

We think these factors suggest a healthy respect for change and for the consequences of change. Moving courses to the Web is not an isolated activity. It has an impact throughout campus structure and campus practices!

Stories About Web Course Models

Faculty who have journeyed to the Web can provide first-hand accounts of the experience. This section features stories from five faculty members who teach courses using the Web. Each of these stories demonstrates a different approach to moving to the Web, while still focusing on the important goals of teaching and learning.

A brief introduction to each story highlights which type of Web course the faculty member teaches (WebEnhanced, WebCentric, or WebCourse) and the issues that are of greatest interest. Common to all these stories are changes the Web is making in three aspects of higher education:

- changes in the amount of *time* faculty and students spend collaborating with each other
- changes in the *expectations* of faculty and students
- changes in the types of *resources* that are being used in teaching and learning environments

WebEnhanced Course Stories

A WebEnhanced course is one that makes use of Web technology to support four types of effort:

- support *distribution* of course materials
- support student *access* to course materials and related resources
- support *dialogues* between faculty and students, among students, and between students and resources
- support *management* and *assessment* processes.

A WebEnhanced course usually starts as a traditional campus class, but with the addition of e-mail, bulletin boards, and student postings gradually creates a 24-hour, 7-day a week supplemental classroom on the Web. Most of us who have done this have a goal of creating a learning community on the Web. Recall that a WebEnhanced class generally retains the requirement of the regular schedule of classroom meetings on campus. Less time is usually spent on administrative chores such as presenting the schedule for the next exam or the next report because these types of items are always easily available on the course Web site. In other words, class time is usually improved due to more available time for substantive dialogue. A WebEnhanced course has about 20 percent, or 30 hours, of the course interactions on the Web. This 30 hours is a mix of faculty and student investment in the course.

A WebEnhanced Course Story: Business

Eric L. Hansen, associate professor of management at California State University in Long Beach, teaches a graduate course in an MBA program. This class meets once a week in the evening and has 20 students. Hansen moved into the WebEnhanced mode with the use of one of the WCM tools previously described.

Having gone through a WebEnhanced experience with 20 graduate students, Hansen began using many of the same techniques in an introductory management course. He is also planning to test this mode of teaching with larger numbers of students. So we will want to stay tuned for Hansen's further experiences. As you read Hansen's story, watch for how he uses the Web environment to enhance student discussions–occasionally seeding the discussion with "a few cryptic comments." Also notice his techniques for managing the flow of documents, now mostly electronic, and student feedback on key projects, and how students make use of technology to meet in teams, although they are all commuting students.

Using a Web Course Management Tool with Business Students

Eric Hansen

During the spring semester of 1998, I used an instructional support Web site provided by Blackboard, called CourseInfo, as a teaching and learning tool. My experience with it was very positive, and I want to share that and also hear from others about their experiences. CourseInfo is a class management set of Web pages. It appears to work with any browser, although Netscape Communicator and Internet Explorer 4.0 are the ones most commonly used by my students.

The course that I taught was an MBA capstone course. I teach this course on campus in a traditional classroom. The seminar, with twenty students, meets once a week for three hours. There is no distance learning component. Students typically organize themselves into teams of four, resulting in five teams.

I do not use a textbook. Instead, the reading consists primarily of journal articles and one or two supplementary books. I make extensive use of Harvard Business School cases, both for discussions and for written assignments.

For each class, all five of the student teams prepare to present the discussion case. Then, in class, I select one team at random to actually present the case, and a second team, also at random, to critique the presentation. A general discussion of the case and the assigned reading material follows.

The midterm exam is a team take-home case. During the semester, each student also writes a four-part paper, called an Individual Project, in which the student analyzes his or her current work situation and develops a plan for the company and for himself or herself.

The CourseInfo Web site consists of a number of different online modules which I used in a number of different ways to support the student learning experience. The announcement feature on the home page was a good place for general information and as a backup to general e-mail. Of course, there's the standard page to set up the syllabus and course description. I noticed practical advantages to being able to communicate with individual students, a group of students, or all of my students at any time, without having to wait for the next class meeting.

Students uploaded all of the papers they submitted, and I graded them and sent them back. Because we were not tied to submitting paper, I offered students the option of turning in drafts of their papers early via CourseInfo so that I could give them preliminary feedback. For any given assignment, about half the students took me up on my offer. It definitely improved the quality of their learning experience, judging from the improved quality of the papers. Early feedback also gave them more control over their grades. For me, grading a paper the second time was much faster than grading one from scratch, so I don't think that I put in much, if any, extra time for providing this service for my students.

A related benefit was my ability to manage the students' workload. For example, this class met once a week, on Tuesday nights. But because students were submitting papers by uploading them rather than turning in hardcopy, I wasn't limited to having Tuesday night due dates. Students had the ability to submit papers at any time. In practice, they frequently opted to turn in their papers on Sunday evenings or first thing Monday morning. The communication module was probably the feature used most frequently. Each team had a homepage, and they used its chatroom feature to hold online team meetings to work on their case preparations. This was important, since the students all commuted, and arranging off-campus meetings was generally inconvenient.

The discussion board was the most active single feature, so far as I could tell. Because there were twenty students in the class, classroom discussions generally left several people out, especially the shy ones. Initially, I decided to remedy this by using the discussion board as an extension of the classroom discussion. Thus, students who were not as extroverted as others were able to participate actively in "classroom" discussions. To energize the discussion board, I would seed it with a few cryptic comments of my own about the next reading assignment, and what it might have to do with the assigned case. This made the discussion very relevant for the upcoming case presentations.

As you can imagine, the discussion board took off and became the "hot spot." In addition to accomplishing its intended purpose of including shy students in the discussion, it emerged as an ongoing daily dialogue centered on course topics. By the third week of the semester, the quality of the written and oral case presentations shot up, and it stayed higher than I've ever seen it for the next 12 weeks. This, in turn, energized the in-class discussions.

The grading module allowed students to use their passwords to access their grades at any time. This had a number of advantages over other approaches. First, it kept the students much more informed about where they stood with regard to their grades. This saved me time answering individual questions. Again, it further reduced the amount of paper with which I had to deal. Instead of walking into class carrying thick folders full of student papers and grading materials, I would bring the night's discussion case, nothing more.

Putting this all together, the total impact of using CourseInfo was greater than the sum of its parts. At least for this class, using this tool radically changed the nature of the learning experience. Students were used to having a one-night per week class meeting, with one outside team meeting every two weeks to prepare assignments. The addition of CourseInfo, with its set of online modules, metamorphosed this traditional experience into an ongoing, interactive community of learners.

I personally had more fun teaching this course than I've had in a long time.

When introducing the students to the idea of a WebEnhanced course for the Introduction to Management course, Hansen used this description to present his expectations:

> In this class, we will use an instructional support Web site called CourseInfo. It will serve as a center for discussion and information exchange. It will provide you with interactive, current information about a variety of things that we are discussing, such as cases, your grades, communications from your team about meetings scheduled, and announcements from me. Some of this information will come from me, some from your classmates, some from other sources, and some will be provided by you. You will either need to have Internet access at home, or you will need to use the North Campus Library computer lab, the CBA Computer Lab, or some combination of these. In this class, you will submit all of your written papers by uploading them to the Course Site. You may not hand in hard copy papers. You may not hand in diskettes.

As can be seen, the need to have access to the Web, and to understand how to use it, is a requirement that must be addressed. If it is *more* difficult for a student to access the Web than it is to access the campus library, then neither the course nor the students will probably be successful in this environment. If accessing the Web is *equally cumbersome* to accessing the library, then it will probably work. If accessing the Web is *easier and more convenient* than going to the campus library, the students will probably learn to strongly prefer courses in the Web environment.

A WebEnhanced Course Story: Chemistry

This story about a WebEnhanced course in chemistry is quite different from the story with business students. John Moore, a chemistry professor, has larger numbers of students–250 to 350 each year–and is generally aided by graduate assistants. In this course, the on-campus interaction still includes large lecture classes and labs. So the course structure is very similar to what we are accustomed to in traditional on-campus environments. Yet a significant amount of interaction and activities is now in the Web environment, and the use of other media-rich resources, such as CD-ROMs, are part of the students' learning package.

In this case, the major enhancements from the Web environment appear to be in three areas: lab preparation; tracking, assessment and monitoring of student learning; and increased accessibility to faculty and teaching assistants. The online quizzes and related references also help to ensure success in a difficult course by providing structured resources for filling in conceptual gaps that students may bring to the course. Notice that this WebEnhanced course also uses a WCM tool to help create the central, focused Web site for the course. The tool used in this example is WebCT.

Large Classes of First-year Chemistry Students Take to Technology at the University of Wisconsin-Madison

Colleen McCabe and Kathy Christoph

John W. Moore has been a chemistry professor at the University of Wisconsin Madison for over 20 years. During that time, he has continually faced the challenges of teaching beginning lab chemistry to large numbers of students. In January of 1989, he anticipated some of our now common online Web tools by writing these prophetic words in the *Journal of Chemical Education*: "Computer-simulated experiments, interactive videodisc lessons, instrument simulators, and computer-based data collection and analysis provide a golden opportunity to greatly broaden the horizons of laboratory instruction."

Ten years later, Moore has integrated these computer-based tools and World Wide Web applications into his two-semester general chemistry course. This course enrolls 250 to 350 students each year, and consists of lectures, discussion sections, and laboratory work. The use of e-mail, the World Wide Web, CD-ROM materials, and video technology has enhanced learning and improved safety for these students.

The recent addition of WebCT, a Web-based learning system software tool, provides a tool to offer online quizzes in place of homework and prelab assignments. Students now have easy access to multimedia-rich tutorials and descriptions of lab procedures, equipment, and techniques that they use each week in the chemistry lab. The online quizzes test their understanding of this content.

There are two kinds of online quizzes each week: one for lab and one for homework. Students have two opportunities to take each quiz. They receive immediate feedback on the quiz as soon as it is submitted. For any wrong answer, students are given sources for exploring the answers on their own before retaking the quiz. "This really helps results," says Renée Cole, a postdoctoral fellow, who creates the quiz questions and tutorial references. "Students may have learned the proper procedures and vocabulary in high school, or they may not have. They may also have some significant gaps in their backgrounds. This method of pretesting provides a review for some students and an important introduction for others."

Cole is convinced that the use of WebCT templates has made less work for the teaching assistants. Quizzes are scored, feedback delivered, and grades recorded electronically. Quizzes also provide a database of questions and answers that are valuable as study materials for in-class quizzes and exams.

Since the use of WebCT on this campus is still in its early stages, the chemistry classes are not yet using the bulletin board feature. However, Moore and Cole hope to use it soon. They believe that the threaded discussion concept, where students can have a dialogue or discussion online, will facilitate student group work. Students work in groups of three to five on laboratory experiments and also to work together to solve "challenge problems" in class. These challenge problems are more complicated conceptual problems which often require the groups' collective knowledge to be solved.

The chemistry department Web server is the host for the online syllabus, previous exams, lecture notes, teaching assistants' home pages, and various Web site references. The interactive lecture, which uses multimedia presentations and live demonstrations of chemical reactions, prohibits the Web from substituting for class or lab attendance. According to Moore, "Although some redundancy is inevitable, and even desirable, students know there is unique information in the various methods of delivery. Technology has allowed us to expose students to material in different ways and thus touch a variety of learning styles."

At the beginning of the semester, students are provided with two CD-ROMs that contain video clips, computer-generated animations, and software programs to supplement the traditional textbook. Moore states, "Our main objective is to have students develop a conceptual understanding through problem solving rather than memorize some facts they might expect to know for an exam."

Students with their own computers are best situated. However, the chemistry department has its own computer lab, and the UW-Madison campus has 15 computer labs at locations around campus. Some are open 24 hours so no student is at a significant disadvantage. Students are encouraged to use e-mail to ask questions of faculty and teaching assistants. Moore reports that "students are quick to send e-mail if they feel something is wrong with a quiz question or answer." Cole has noticed that "some students are not comfortable with face-to-face interactions and can ask their questions at a convenient distance by using e-mail."

The UW-Madison chemistry department is fortunate to have a professional videographer who can quickly provide a multimedia clip specific to lectures or labs. He has also served as a resource to more than a dozen visiting faculty who came to Madison to help create video and multimedia materials. Moore estimates that more than ten person-years are wrapped up in video production for the chemistry department–not an insignificant cost. Much of the funding for these efforts was provided by two NSF grants.

The technology that Moore envisioned more than ten years ago was not just a pipe dream. The chemistry department at the UW-Madison has worked toward making his vision a reality, to the advantage of faculty and students alike. Entering students, already comfortable with computers, can use the tools of e-mail, WebCT, CD-ROMs, and the Internet practically anytime, anywhere to participate in the learning process.

But more critical to Moore than the improved access to learning that technology offers is the way technology changes the student role in the learning process:

> I believe that the most important criterion, and the most important improvement technology can bring is to place students in an active rather than a passive role. People learn best by doing, observing, thinking, making choices, and discovering the consequences of those choices–by being active.

A WebEnhanced Research Seminar on the Web

This story comes from Jack Child, a Professor of Spanish and Latin American Studies and the Director of the Center for Teaching Excellence at American University in Washington, D.C. This course focuses on his use of the Web for enhancing the process and the outcome of the research project that constitutes a major part of the course. The students review and comment on each phase of the research project and share ideas on how to proceed. Others in cyberspace are invited to comment, and do so! This is a good example of how the Web can facilitate collaboration and shared discovery.

The Web also supports increased use of a discipline content database which links to other content sources and can be used as supplemental course material. Another key goal is that of teaching how to teach with technology so that more new teachers can make better use of technology.

Child comments that he is probably going to move away from the use of a generic Web application tool to one of the newer WCM tools. He hopes this will save time for him and his students. Note also his plans for developing course-specific or discipline-specific CD-ROMs to accommodate the large amount of content needed. Here is another opportunity for content publishers, or for Child to publish it himself.

Research Seminar on Spanish American Studies

Jack Child

This paper provides a brief summary of how the author moved a traditional Spanish/Latin American Studies graduate seminar to the Web. The goal of this project was to use technology to enhance the course. A second goal was to introduce teaching assistants and potential teachers–the master's degree candidates in the seminar–to ways in which they could apply computer technology to the courses they were, or would soon be, teaching.

The name of the course is Spanish Graduate Seminar: Cultural Movements in Latin America. The course description from the course catalog is as follows:

This course will examine a series of cultural movements in Latin America as seen through their literature and art, and analyzes how they have influenced, and have been influenced by, the historical and political setting of their times. The cultural movements include: the pre-Columbian currents; Renaissance; baroque; neoclassicism; romanticism; costumbrismo; realism; naturalism; modernism; and early 20th century currents.

The seminar will also emphasize appropriate techniques to teach Latin American literature, art, and culture at all levels. These will include the integrated use of visuals, cultural objects and computer-assisted instruction, such as CD-ROMs and the Web. The resources for this seminar include a CD-ROM disk with sample programs, including two on Latin American painters which will be the starting point for an oral and written report on a Latin American painter. This CD will be loaned to all students.

The course has an experimental Web site as part of American University's emphasis on educational technology. This Web site's home page has links to the course features. Of special interest is the "Daily Review" section that contains questions focused on the assigned readings for each class. There is also a Web page for each student in the course. Progress reports on each student's research projects, plus other materials, will be posted to this Web page. The URL address for the course Web site is <http://gurukul.ucc.american.edu/jchild/LAHAL_home.html>.

Research Project as a Collaborative, Multi-Staged Process

The syllabus included the following instructions for students, explaining how to put their research projects on the Web, and the stages for discussion and reaction from other students. This research project comprised 40 percent of the course evaluation:

Students are expected to research and present to the class, in Spanish, a Research Project related to the themes of the course. The presentation will be developed in four phases:

1) A one-paragraph proposal
2) An outline and report on sources
3) A100-word abstract of the final paper
4) A 10-minute oral report in class and a final written report of about 20 pages

Each of these phases of the report is posted on the student's Web page as it is completed. The purpose of putting the successive stages of the paper on the Web is to permit the other students in the class–and anyone else in cyberspace–to comment and offer suggestions. You will be expected to e-mail–with hard copy for the faculty member–your comments on each of the other students' efforts at each step in the process, and your comments will form part of your grade. The software we will be using to prepare our Web pages is Adobe Pagemill for Macintosh, and students are encouraged to add visuals and hypertext links similar to those on our course Web site.

Tools Used for the Course

The template used to develop the course Web site was Adobe Pagemill, available in both Macintosh and Windows versions. The faculty prepared a template for the students' material on a floppy disk, which was distributed to the students. The template had Web pages for the various elements of the research paper: proposal, outline, sources, and abstract. The floppy was turned in to the faculty for posting on the Web at the various due dates. Students were encouraged to be creative with their Web pages, and add to the template visuals, animation, sounds, and anything else they thought relevant. Some of the visuals were taken from commercially available clip art, and some were scanned in digitally from original art sources provided by the students. These digital sources were relatively inexpensive. Art Explosion, for example, sells CD-ROMs with 250,000 digital images for under $100, and a set of these was purchased with Teaching Center funds for the students. The visual sources developed by the students included their own personal photographs and art work, which was essentially free except for the time spent preparing and digitizing with flatbed and slide scanners.

Each student was required to comment on every other student's work, in Spanish, at each stage using a course discussion list; all students and the faculty member received a copy of each message. We discovered that outsiders from other universities in the United States and Latin America also joined in the commentary.

Building a Course Database for Use Across Courses

One additional feature of the course Web site was a set of questions on each week's reading assignment. The instructor already had an English and Spanish text that he had authored and placed on the Web for an undergraduate literature course. Links were established to these questions as a point of departure for the evening's class discussions. Additional materials, more suitable to a graduate course, supplemented these undergraduate course materials.

Best Outcomes from This Experience

The best thing about this experience was the interaction among the students as they reacted to their peers' research proposals under development. Using the Web and the course discussion list, students corrected, made comments, and offered suggestions and additional sources for research information. The papers became far more collaborative than under the old approach, in which each student worked in isolation.

The next best thing was the students' creativity in designing and creating their own Web pages. Although they were initially constrained by the instructor's assigned template, they also felt free to deviate from it and designed their own, retaining the essential course elements.

We also profited from comments made by people not taking the course, who happened upon the Web page while surfing. My favorite e-mail message in the course was the following: "We were surfing the net and were very impressed by the course site, especially Lindsey's Web page. P.S. Of course, we are Lindsey's parents."

Other Responses, Concerns, and Evaluations

Student response was very positive. One or two complained that the Web emphasis was a problem because they had no computer at home, and the computer labs on campus were frequently crowded. This has been a persistent problem, but each year more students have their own computers, often with dial-in modem access from home or work.

Faculty Perspective and Future Plans

From a faculty perspective, this was an interesting and rewarding experiment in using computing and Web technology to enhance a course traditionally offered in weekly face-to-face lecture and discussion sessions. More time was spent in preparation, due to the need to develop the Web template and transfer the students' input onto the Web site. This was not an unreasonable commitment, and the course stands ready and available, with some modifications for the next offering of the course in a semester or two.

As far as future plans are concerned, we are experimenting with several commercially available course-authoring packages, which will greatly simplify the task of organizing the course for the Web, and which will permit threaded discussion of given topics. We are also preparing CD-ROMs with the textual and graphic materials used in the course to include the approximately 1,400 slides that provide historical and artistic "windows" into the cultural history of Latin America. Because of the sheer size of these materials–about 500 MB–it is not feasible to put them on the Web. Each student will receive CD-ROMs as part of the course package.

WebCentric Course Story

How does a WebCentric course compare to a WebEnhanced course? A WebCentric course is similar to a WebEnhanced course in that they both make extensive use of Web technology. A WebCentric course uses the Web to support the same four course functions–distribution, access, dialogues, and management and assessment–that the WebEnhanced course does, but expands these functions.

For example, because a WebCentric course significantly decreases the requirement for location-based, synchronous classes, most WebCentric courses have more components on their Web sites that serve the direct teaching or lecturing function, also known as the faculty-to-student dialogue. These direct teaching activities can look very much like lectures. They might be software-generated presentations with an audio track. In fact, they are often called minilectures. They can also be simple instructions for learning activities or expanded directed learning experiences.

Another common faculty function is coordinating discussions and then providing debriefings and analyses. On the Web, tools with structured spaces for discussions for and faculty office hours often serve these functions.

A WebCentric course has between 60 percent and 75 percent of its content from prepackaged course materials, such as an adopted book plus Web content. The amount of dialogue and interaction can be anywhere from 10 to 20 percent, and more if the students really take charge.

Health Behavior and Anatomy Notes

Elizabeth Hawthorne

This story about a WebCentric class begins a long time ago in Net Time, the late fall of 1994, when Susan Monk volunteered to participate in a technology-rich, student-centered learning initiative at Penn State, dubbed Project Vision. Participants were selected only moments before Santa began to aim for chimney tops. Monk was one of nine faculty members and three librarians at three Penn State Commonwealth campuses who took part in this project.

Six faculty were given a semester of release time and summer support. Their mission was to learn the technology and to develop and deliver four Web courses for first-year students in 1995-96. These courses would use the World Wide Web and other electronic communication tools to promote active student learning and eliminate all lectures. At that time, Monk was familiar with computers. What happened subsequently was unpredictable.

The Beginning

In Monk's words, "We were given laptops, training and time; otherwise I wouldn't be as far ahead as I am now. The key was to become comfortable with the software so you could see what you could do with it for teaching. Technology can lead your teaching–you have to learn it to know what's possible." The faculty all felt that it really helped to be working with colleagues who were all learning the technology at the same time and who together would create a new model of peer learning for students.

Monk's part of this project, together with two colleagues, was to redesign a course in health behavior, a general education course for first year students at Penn State.

The instructional strategies that had been used in the past for this course included many student presentations and group discussions, so the faculty did not significantly revise the course content or approach. Using the Internet and presentation software to enhance these strategies seemed natural. Monk comments that, " It would have been very difficult for me to convert a lecture course to an online environment. That's a much more dramatic kind of shift."

The students also had to become familiar with the technology. They learned to use presentation software, to search the Internet, and to access library resources remotely.

The Middle

Monk and her two colleagues delivered the course to three classes of twenty students each. These students were spread out across three campuses: Berks, Delaware County, and Mont Alto. The course meetings and discussions were all online. This made the shift away from lectures easier, because the faculty member and the group of students were not in the same physical space.

A WCM tool, First Class, was used to help manage online discussions and seminars. E-mail was also used extensively. The faculty member and the students met via Pictel videoconferencing equipment in campus classrooms that were turned into "Learning Studios."

The Now

Monk and her colleagues continue to offer this course in this WebCentric approach, even though all the students are now on the same physical campus.

What About Other Courses?

Although this story focused on the WebCentric course designed for the Project Vision initiative, Monk's experiences also changed her non-Project Vision courses. Monk comments that, "It has dramatically altered everything that I do. I teach everything using technology."

"In my smaller courses, the students do projects, and part of their lab experiences require researching a topic and doing a PowerPoint presentation on it. They learn about researching on the Internet so they can present the main issues. In my larger classes, students have access to my PowerPoint presentations online. I think this helps the students. I try to get them to look to the Internet for answers. I put sample physiology and anatomy questions online and it seems to help; students' grades are higher than before. Students can review lecture notes and exam materials. Students are willing to study if they know what to study."

When teaching physiology and anatomy, Monk uses PowerPoint presentations that incorporate the dynamic capabilities of the computer. She says, "I find it particularly exciting that I can show movement which I couldn't show before. You can go nuts in physiology using your hands and whatever to try and show something. Now I can include movement–showing an ion channel opening and closing, for example. This improves the quality of student learning and makes students more confident."

But using technology for teaching and learning isn't all positive, according to Monk. Some of the concerns she expressed include the amount of time needed to develop suitable slides for presentations and to create a Web site. "Of course," she observed, "now that the slides are developed, they are done. I can reuse them repeatedly and modify them readily as research informs our understanding of the fields in which I teach." Another challenge is the extra time she now spends with students via e-mail. "It's extra time, but it's time I don't mind. It gives students an opportunity to get questions answered that they might not be able to get answered or even ask face-to-face. It increases informal interaction after the e-mail exchanges." And research has been clear that this extra time spent on out-of-class contact helps retain students and enrich their collegiate experience. Another concern is the cost of some of the software, e.g., Animated Dissection of Anatomy for Medicine (A.D.A.M.). Fortunately, lower cost versions are becoming available.

Monk's story is a continuing one. "After 26 years of teaching, I am renewed by the challenges of the new technology and relating it to teaching. Technology has improved my teaching and has improved student learning. I am certain of it. I feel a part of the information revolution that is happening, and, because of the abilities I have been able to develop, I am helping my students be a part of the information revolution as well. There is an exhilaration of being involved at the beginning of a new age, especially one this profound. I could never go back."

In this case, the institution opened the door, but Monk made Web-based learning happen for her and for her students.

WebCourse Story

A WebCourse, as described earlier, is a course that can be taken anywhere, anytime, by almost anyone. There are no requirements, or very minimal requirements, for location- based gatherings. There can be requirements for synchronous activities if Web technology or other remote distance technology is used. A course that is fully on the Web is usually designed and developed with a distance learning population in mind. On-campus courses generally tend to be either WebCentric or WebEnhanced courses. The amount of design and preparation needed for a WebCourse that is completely or almost completely online is costly and usually takes a minimum of nine months to prepare. In some higher education venues, WebCourses tend to be designed and developed by faculty or teams and then delivered by other instructors or tutors. In fact, the materials and content of courses developed by publishers are almost WebCourses in need of a good delivery instructor! Again, everything is changing, so the moment after you read this, you may find a contrary example.

The story that follows is more than a story about a WebCourse. It is a story of how a complete degree program evolved to be successfully offered as a degree program on the Web implementing the WebCourse model. One of the most important lessons of this story is the realization that students who take courses on the Web usually want a full sequence of courses leading to a certificate, degree, or specialization. This is the area that promises the greatest growth for the future. The issue of accreditation is an important one in any program, particularly programs heavily dependent on technology and distance. Schihl has been shepherding these programs through accreditation with great success. These programs are serving as models for how to achieve effective learning and community at a distance over the Web.

This story reinforces many of the concepts that we have been developing. You may want to pay special note to the following two. First, notice how Schihl defines "distance education" as "any learning that occurs outside the classroom but is mediated by the university." In other words, students taking Web courses did not have to be at a distance. They could be close, but not on campus. They "took the geography out of distance." Second, note the definition of residency as "building a community of scholars." How this is being achieved is still a challenge, but this definition clears the way for new thinking about just what a community of scholars is and what graduate programs might hope to achieve by requiring a community residency, rather than a physical residency. Also, be sure not to miss Schilh's management approach to the design and development of these programs. In his words, "We were the cutting edge. We tried things, made improvements, and moved on." Creating effective instruction in the new environment requires freedom to experiment, and to continually adapt, refine, and succeed.

Doing Full Degree Graduate Programs Online: 1994-Present

Robert Schihl

Do you really want to do distance education? In the fall of 1994, the prospect of seriously doing distance education was limited. The specter of mail correspondence degree mills had always hung heavy over traditional campus education. There was real criticism of anything that smacked of distance education on a campus-based institution.

Regent University in Virginia Beach, VA, is a new (founded in 1978), highly respected graduate institution, fully accredited by the Southern Association of Colleges and Schools (SACS) and the state of Virginia. The school's first Ph.D. degree in Communication Studies was added in 1991 and was subsequently accredited. Would we jeopardize our quality program with a distance track? For most students already in the program, and for a number of faculty, the response was an unqualified "no way."

In November 1998, Regent completed a SACS site visitation for a ten-year accreditation reaffirmation, and was fully accredited for both on-campus and online degree programs at both the M.A. and Ph.D. level in communication studies. The online Ph.D. program in communication was in its fourth year and the online M.A. in its second. The site visitors called us a "role model" of accreditation, with the fewest recommendations in the chair's seventeen accreditation committees.

How are we doing quality graduate Web-based distance education? We began during the fall of 1994, with both feet in the Web for full degree programs. Our Web site for our first online program, <http://www.regent.edu/acad/schcom/phd>, speaks for itself. We made some conscious, philosophy-based decisions to expect minimum computer literacy from both prospective distance students and faculty. All asynchronous computer utilization requirements would be as simple as possible. No more computer hardware or software applications were implemented than absolutely necessary, and the implementation had to be accomplished as cost efficiently as possible. Hence, we went with a freeware Internet browser (Netscape) with attached file e-mail capability. The procedure was clear to us. The World Wide Web would become our virtual college, hosting all permanent documents for the program: e-catalog, e-application forms, e-registration, faculty resumes, and course syllabi and other information. E-mail with attached file capability would suffice for the day-to-day maintenance of a course, the exchange of written assignments, and faculty-student and student-student interactions. Needless to say, university services also kept up with the college's distance development. The library went online, academic services went online, and student services went online concurrently.

Some secrets of our success? First, the immediate burden of developing Web-based education had to be placed in a faculty Webmaster who would be responsible for all Web site development, and, especially, posting faculty syllabi for all courses. Asking faculty to learn and use HTML would be an unnecessary intrusion into already busy schedules. Faculty development workshops provided the basis for adapting existing course syllabi to the Web. A gradual introduction to Web-based teaching was agreed upon; two courses were introduced to the Web per semester until all courses were converted.

We had also agreed that any student accepted into the university could take any course from either track. Distance education became defined as any learning that occurs outside the classroom but is mediated by the university. We took geography out of distance. We found that there were local students who could not take some classes (often delaying degree completion) because of family and job commitments. Distance courses allowed them to take courses at their own time and place.

Distance learning opportunities brought in a whole new target audience for our graduate degrees: faculty of colleges and universities already teaching but in need of terminal degrees. These faculty could get only a one-year sabbatical leave to study while our programs have a two-year minimum required coursework period. Now, these applicants could study on campus for one year (and the two adjoining summers) and complete their coursework at home and on the job.

Another secret to successful distance education for accreditation purposes was residency. We define residency as building a community of scholars. The faculty want to meet their distance students; there is still a deep-seated need for interpersonal contact. We accomplish residency in two ways: a prestudy on-campus workshop the summer before beginning distance studies (four weeks for doctoral students, two weeks for master's students) and a one-week on-campus seminar each summer following continuing coursework. During that time the students learn the distance support resources of the library, the computer services support available, and the graduate-level demands of writing style forms. Added to these components, each graduate faculty member addresses the students and presents his or her research interests and publications. For the doctoral students, the graduate faculty propose research projects, create research groups, and begin actual research that will be continued with the students from their home learning environments. Field convention papers and publications are the goals of these early research endeavors.

What would be done differently if we were to do it all over again, knowing what have we learned? Our first lesson was that there were no guidelines, no manual, no history of online graduate level degrees. We were the cutting edge. We tried things, made improvements, and moved on. Facing serious accreditation scrutiny early in the history of our degree program, we knew that our accrediting body was considered conservative. Our early choice in building the Web-based degree program was to remain as close as possible to a traditional education paradigm. Hence, we stayed in the semester time frame for beginning and ending courses. Our online courses were also to be equivalent to their on-campus double except for delivery; the online degree was to be equivalent to its on-campus double, save residency.

We also found that we learned and adapted as we gained experience. Our early focus was to build an academically superior distance learning experience that could rival its on-campus equivalent. In doing that, we lost a balance for the distance learner. We were too slow to create the nonacademic experience for the distance learner; we failed to establish residency in the form of orientation, cultural life, and peer interaction opportunities for the off-campus learner. But as we discovered our omission we began to remedy it. We videotaped the graduation and video-streamed it on our Web site. We contracted to videotape an original theatre production (we have a theatre arts major in the college) and added it to our Web site. We produced a distance student orientation site and introduced an electronic version of an on-campus graduate colloquium.

What are some of our pedagogical accomplishments? One of our challenges was to reduce a distance student's on-campus presence during doctoral studies. Originally, we felt that a student should be back on campus for qualifying exams and oral defense, dissertation and thesis proposal defenses, and final dissertation defenses. We developed a proctored procedure, so that 16 hours of written qualifying examinations can be securely conducted online. The same proctored procedure allows us to hold the oral defenses via telephone conference call. With no security demanded for a dissertation proposal defense, a conference call alone suffices. We still require a face-to-face dissertation defense on campus.

We also are trying synchronous computer-mediated learning at the dissertation writing stage. Most faculty know that the most fruitful time with their dissertation chair was side-by-side going over written dissertation drafts. With a video camera and software like NetMeeting, the candidate and chair can see and hear each other, and they have the same dissertation text file on the screen for editing purposes.

We also discovered the value of RealAudio for audio taped speeches used in a political communication course and the role of audio tapes for a script and screenwriting course. RealVideo serves our media studies area well. We are on the verge of creating our own interactive CD-ROMs for many courses.

Do we want to do more distance education? The success of four years and the first graduates from the all-distance degree track has prompted us to consider new degrees which will be offered entirely online, perhaps in arts and entertainment management and in media education. I think it is safe to say that we are discovering the future in achieving successful distance education today. Indeed, "chance favors the prepared mind."

Developing Web Databases

Thus far, the stories have largely focused on how one faculty member moved one course to the Web. In many respects, this is similar to the crafts approach in the Middle Ages. Every product was designed and developed by a master crafter. Each product was special but very expensive. Given the time and effort required by this approach, the demands of society for new types of learning, and the flexible and linked possibilities of the new media, is there another way?

The Electronic Quad

The story of the Electronic Quad describes a new model for how instructional materials might be developed and shared for teaching and learning in the future. The Electronic Quad is an experiment in distributed educational materials development and delivery. Faculty from six different universities cooperated in a project to develop and use shared instructional modules in their field of communications studies.

This project, they said, had its origins in several interrelated goals, objectives and beliefs:

- The application of a "componentware" approach to the development of educational materials. The goal of this approach is one that the developers of educational software have been trying to achieve for many years. A component approach can offer advantages in the areas of reusability, cost reduction, and development time reduction. It is a strategy by which a set of materials–larger than needed for a single course–are developed. Faculty then select content from this array of modules or components to construct a course based on the course requirements and goals and the particular student population and delivery environment.
- The application of pedagogies that integrate an active, cooperative, team-oriented approach to learning. This reinforces the movement towards focusing on greater student responsibility and activity in learning and in student-to-student dialogue.
- The use of Internet-based instructional delivery to support not just distance learning, but learning in context (e.g., just-in-time instruction).

- The use of new collaboration technology to support cooperative instruction by communities of teachers and students.

In addition to building components of courses with these goals and criteria, the Electronic Quad involved the creation of an educational testbed and the development of tools to support distributed education. During the project, the project team identified four basic types of tools used by all faculty. These four tools included a simple Web publishing tool or Web course management tool, a tool to support online surveys or student workbooks, use of common synchronous and asynchronous audio and video technology, and Web lectures using presentation software tools. By using this set of tools, faculty members created environments for electronic courses.

Electronic Quad was set up to prototype four critical technology solutions to support a distributed instructional community:

- A digital archive of shared instructional materials
- Groupware applications to support coordinated development of materials
- A database to store student work and grades
- A business model to motivate and manage cooperation

The six universities participating in this project are the University of Illinois, Urbana-Champaign; the University of Arizona; the University of Kansas; Arizona State University; the University of California, Santa Barbara; and Michigan State University. This story was presented at EDUCOM 98 by Barbara J. O'Keefe, University of Illinois, Urbana-Champaign; Sally Jackson, University of Arizona; and Richard Williams, University of Illinois, Urbana-Champaign. This project was supported by a grant from the Advanced Technology in Higher Education Program at the University of Illinois, Urbana-Champaign.

The project continues a theme that is emerging based on the new capabilities of our technology to be sliced, diced, combined, and recombined. We like to call this "beyond the course," as a unit of analysis, planning, and delivery. Thinking at this level may be a tool in restructuring for productivity and accountability.

Common Questions About Web Courses

Faculty who are asked to move their courses to the Web are really in the forefront of the transition to the new paradigm. Like a kaleidoscope, these first faculty are being tossed about in the change of the pixels from one steady state to another. While we have started to see a clearer vision of teaching and learning on the Web, we still have many questions:

- What kinds of content work well in a Web course?
- Are there any kinds of content that are not appropriate?
- Are there any levels of courses that are not appropriate?
- Which students are best suited for this environment?
- How can we develop relationships with a class? Is the class entity going to be replaced by lots of individuals? Can we achieve a class community?
- How can students learn to be more independent?
- How can faculty handle 25 to 30 students, and possibly many more, in this environment?

We can't know the answers to many of these questions in any depth for some time. We all will need to contribute to the answers.

Concluding Thought

The idea of moving to a new teaching and learning space, a space that is really not a space at all, is a new one for some of us. Some of us feel that it is just not possible to develop and cultivate relationships across space and across time. As we learn from our experiences, we discover ways to succeed in teaching and learning in the virtual classroom. In another few years, we may not be able to imagine how we ever taught without the Web. The next chapter provides a look at how to use the tools to help students learn and help faculty teach in a more collaborative manner.

CHAPTER 9
CREATING AND SUSTAINING ONLINE COMMUNITIES

Overview

American pioneers moving across the West faced life-threatening hardships along the trail. After arriving at their destination, they faced the challenges of settling new homesteads and building new lives. They faced a myriad of questions. What food would grow? What type of shelter should they build? How would they govern themselves? How would they relate to their neighbors, and how would they relate to outsiders? In other words, they had to determine how they would become a cohesive unit, a community.

Faculty and learners in a Web-based environment have similar challenges. We've made our journey to this new online environment. Now, how will faculty and students build new spaces and conceptualize new ways of interacting. How will learners operate within this environment? What are the roles and expectations? Who will govern this new environment?

The new digital communication tools support types of interaction between the students and faculty that were never possible before. But how should those tools be used? What types of applications make sense? How are they best used for instruction?

Does it seem as if there are more questions than answers?

Even though we are moving from an Industrial Age "delivery" paradigm to an Information Age "knowledge-building" paradigm (Dolence & Norris, 1995), or even what some are calling the "Communication Age" (Thorndike as quoted in Cooney, 1998), our instructional experiences from the face-to-face environment can help build our new online communities.

As we move from faculty-centered to learner-centered instruction, traditional faculty and student roles are being redefined. Faculty are moving from being the sole source of information to becoming facilitators, mentors, and guides. Students are moving from being passive knowledge absorbers to active knowledge generators (Eastmond, 1995; Harasim et al., 1997; Hiltz, 1994; Moore & Kearsley, 1996).

In the online environment, learners are assuming more responsibility for their learning and are even assuming some responsibility for the learning of their fellow students. Some of the traditional faculty responsibilities, such as identifying and generating course resources and leading discussions, are being shared with the learners. Online learners face the challenge of learning new content, while also learning new technology, communication methods, instructional strategies, and roles.

One instructional strategy that faculty have found useful in encouraging students to take responsibility for learning in the face-to-face classroom is collaborative learning. With collaborative learning, students work together in small groups to "maximize their own and each other's learning" (Johnson & Johnson, 1993, p. 138). Group members are responsible for discussing and explaining course content, solving problems, providing feedback, and ensuring mutual success among group members. Learners depend upon one another as knowledge-providers; the faculty help validate students' mutual knowledge building.

The faculty's challenge in this environment is to manage the interaction and collaboration effectively. A faculty member who has used collaboration strategies in the traditional classroom has an advantage, but collaborative activities in a Web-based environment have slightly different dynamics and management considerations.

This chapter discusses the basics of collaboration in the online environment. What is it? Why should it be used? How do you build a collaborative community without face-to-face communication?

The Continuum of Community

Interaction, collaboration, and cooperation are terms that are usually used interchangeably when we are talking about small group work. While similar, each of these terms has a distinct meaning in teaching and learning environments. Each type of interaction can be a distinct stage towards building a learning community; each type of interaction also can be differentiated by the learning goal of the activity, the duration of the activity, and the structure and complexity of the learning experience. The connection between learners usually deepens as interaction time, task structure, and complexity increase. As learners spend more time interacting on increasingly complex, higher-order thinking activities, an online community of multiple, interdependent perspectives begins to form.

Interaction

Interaction is a communication exchange between two or more learners. It is not a prolonged exchange, so there is no lasting affiliation established between learners. When students exchange answers or discuss their ideas with the people near them in a face-to-face classroom, interaction occurs. It is short in duration, fleeting, and does not require that learners maintain or build a lasting connection.

Interaction is used to increase communication and participation, to engage learners in either content or processes, to enhance the processing of content by learners, and to give and receive feedback (Wagner, 1997). In a classroom, a faculty member usually leads the interactive process and is a visible figure in it. When learners are interacting, the faculty member is in the background, but learners still have a tendency to look to the instructor for answers instead of relying on each other for guidance and interpretation.

The major drawback of interaction is that it does not necessarily promote the team building process. For team building to occur, we need to use the next stage of community building–collaboration.

Collaboration

Collaboration is the act of students working together in small groups on a particular activity during a finite time period. One example of collaboration is to form student groups to complete a single activity or a set of activities during a single class. The purpose of group collaboration is usually to analyze a situation, solve a problem, or brainstorm ideas. Learners are connected through the joint activity and the common short-term goal. But due to the short duration of the activity, learners may not become interdependent or look to each other for mutual support as the course progresses.

The faculty member provides less guidance and leadership in collaboration than in an interactive activity. At this collaboration stage, the group may turn to the faculty member to resolve group negotiation problems or to validate certain facts or processes: "They say the answer should be this, but I think it's that. Which is right?" Overall, however, the group operates more independently than students do during simple interaction.

Cooperation

A very fine line separates collaboration and cooperation, which is why the two terms are often used interchangeably. The difference between the two terms, as they are used in the continuum of community building, lies in the complexity and duration of the activities. In cooperative groups, learners work together with minimal guidance from faculty in order to achieve an outcome or goal that can only be achieved collectively and interdependently. Cooperative groups work together throughout a course to complete a series of problem-solving or peer-learning activities that culminate in a product, such as a project report, or an action, such as leading an online conference.

Two key attributes of a cooperative group are that the members are interdependent since all group members must succeed in order for the group to succeed, and individually accountable since each member's performance is individually assessed in some manner.

In a cooperative activity, the faculty member is a facilitator who structures the group and determines the goal or goals of the activity, but the process for completing the activity is determined by the group. The faculty member may monitor the process and provide guidance as needed or requested by the group. As learners become more dependent upon each other, they become more responsible for their learning and move closer to being a community.

Community

A learning community consists of learners who support and assist each other, make decisions synergistically, and communicate with peers on a variety of topics beyond those assigned. Community goes beyond cooperation; it is a self-managing entity.

In a learning community, the faculty member is a community member with a consulting role. Although the faculty member may introduce some activities and discussion topics, the community members also determine additional activities and topics. Learners turn to each other first for problem resolution and knowledge building before they seek information from the faculty.

Community: Why Create It?

Larocque (1997) summarized the sentiments of many faculty members in his paper's title: "Me, Myself and . . . You? Collaborative Learning: Why Bother?" Creating community often seems to take more time and effort to plan and administer than other instructional strategies. So, it's worthwhile to ask, Why do it? What are the benefits?

During the last three decades, collaborative learning has been used throughout all levels of traditional, face-to-face education, from elementary to higher education. Studies of its effectiveness have concluded that achievement, productivity, self-esteem, peer interaction, and group cohesion are higher in collaborative groups than in individual or competitive learning environments (Johnson & Johnson, 1993), and critical thinking is enhanced. In addition, Johnson and Johnson (1993) state that "a dialogue with peers promoted more higher-level reasoning and ability to apply learning than did a dialogue with a computer" (p. 147).

In an online distance learning environment, collaborative learning techniques have been implemented through the use of computer-mediated communication tools such as e-mail, chat rooms, and conferencing software. Computer-mediated communication tools support the small-group interaction, peer collaboration, and teamwork that Pea (1994) found lacking in satellite- and videoconference-based distance learning environments.

Studies analyzing computer-mediated communications indicate that online collaboration can increase participation and decrease student isolation in distance learning courses (Harasim, et al., 1997; McCormack & Jones, 1998; Collis, 1996). Collis further reports that online collaboration increases the likelihood that different perspectives will be introduced, and supports quick and easy communication, as well as the use of interactive instructional strategies.

Building community can also assist in the management of the course. As an online community grows, learners become more self-directed, and tasks such as facilitating discussion, ensuring access to content resources, and providing technical support can be accomplished by members of the community.

Technology Tools that Promote Community

Many Web applications and tools support each of the types of interactions that promote community building. E-mail and chatrooms are tools that fit the short duration characteristics of the interaction stage of community building. Both are good one-to-one communication tools, and they are also useful in collaborative activities. Conferencing tools support collaboration because of the longer duration of the activity and the increasing interdependencies; conferencing tools also support cooperative and community activities.

In these cooperative and community interactions, virtual environments such as Multi-User Dungeons (MUDs), MUD Object-Oriented (MOOs), Multi-User Simulations Environments (MUSEs), and Multi-User Adventures (MUAs) support community building through online simulations and problem-solving activities. These are "imaginary worlds in computer databases where people use words and programming languages to improvise melodramas, to build worlds and all the objects in them, solve puzzles, etc." (Rheingold, 1993, p. 145). Table 9.1 illustrates the relationships between tools and types of interaction.

Drawbacks to Community Learning on the Web

Quite honestly, online learning environments require more time, effort, and commitment on the part of every member of the community. We have identified seven challenges presented by the increased interaction in online learning environments:

- ***More faculty time.*** When learners are new to an online learning environment, online communication encourages an expectation of increased faculty availability and may increase student dependency upon the faculty (Eastmond, 1995). Faculty have begun to report that teaching distance learning courses "is a demanding proposition for professors . . . an enormous amount of work, much more than teaching in a classroom" (McKinnon, 1998).
- ***Nature of online environments.*** Students must face the challenge of interacting without the usual physical and vocal cues of face-to-face communication. Students must also overcome the difficulties of the asynchronous nature of online discussion as it relates to negotiating consensus. Communication is not instantaneous in many cases, and the spontaneity that can be helpful when solving problems is lost. This can slow the group formation process as well as group discussion. Brainstorming, for example, is best done synchronously. The lowly, ubiquitous, and familiar telephone can be a good tool of choice for some activities.
- ***Technology comfort level.*** Comfort with technology is key to whether collaboration takes place. However, discomfort with technology can promote community when a learner reaches out to the community for help.
- ***Less self-paced.*** Another drawback is that sometimes building community can appear to interfere with the positive

Table 9.1. Tools and Types of Interactions

	Interaction	Collaboration	Cooperation	Community
E-mail	X	X	X	X
Chat	X	X	X	X
Conferencing		X	X	X
MUDs/MOOs			X	X

BEST COPY AVAILABLE

aspects of time-independence and self-pacing. The class must stay together in some manner to communicate on the same topics during a particular time frame. A person falling behind can be detrimental to the community when the situation causes frustration or resentment on the part of those who respond in a timely manner and wish to move to the next topic.

- ***Lurkers.*** Learners can have negative perceptions of collaboration if all members of the group are not fully engaged in the process (Hiltz, 1994). Some learners remain community lurkers if collaboration is not perceived as a valuable or essential part of the learning experience.

- ***No emotional cues.*** Students may not feel comfortable disagreeing with one another in text-based communication. Sometimes a student can disagree in a joking manner in a face-to-face environment and peers do not take offense. In an online environment, misunderstandings occur more easily and often take longer to resolve than they do in physical environments.

- ***Inexperience with collaboration.*** Many adult learners have not been taught how to collaborate with and critique their peers' work. Adult learners may also discount a critique that comes from a peer they do not perceive to be an expert in the same sense that a faculty member is an expert. Learners may look to the faculty member to referee the discussion. Learners want to know they are on the right track with their thoughts and may want faculty validation before they accept the opinion of a peer.

How to Build Community

Techniques for structuring collaboration are not necessarily obvious. One faculty member, when asked how to structure collaboration, said, "Well, I give the students the activity and tell them to form groups." While this strategy might work in a physical environment where students have met each other face-to-face, online learners will not automatically group themselves. The anxiety with which learners begin to interact and collaborate online with peers they have never met is similar to going on a blind date. How will I get to know this person? What will we talk about? Will we be compatible? Will we have similar interests? How well will we work together?

Moore and Kearsley (1996) underscore the careful management needed to cultivate community in online learning environments. In an online learning environment, "participation is not likely to happen unless it is deliberately planned and the faculty/moderator encourages it" (p. 119). "The key to being effective," they note, "is that the teacher takes full advantage of the interactive nature of the media. The faculty member brings learners frequently, indeed almost continuously, into action by asking questions, encouraging student presentations, getting students to talk to each other, and in other ways involving them fully in the teaching-learning process" (p. 71).

Many of today's learners have received the bulk of their education in a lecture-based, traditional classroom. Therefore, learners usually require an orientation to their more active and responsible roles as online learners. Increasing the time, structure, and complexity of collaborative activities as the course progresses can encourage this shift of focus for the learner.

Class Activities that Build Community

Johnson and Johnson (1993) found that cooperation among students would not occur unless the students were trained in cooperative strategies. Providing adequate training can be a challenge when a course is limited to one semester. However, the following suggestions for ways in which cooperation can be gradually developed in an online course can help overcome obstacles. With these activities, students can learn collaborative techniques while they learn course content.

- ***Student introductions.*** Begin with an introduction activity. This can be done through an online profile, via a conference posting, or in a more informal area such as a café or student lounge.

  Provide examples of topics learners might like to mention in their introductions. Encourage them to post pictures of themselves to provide visual cues to their peers. These profiles can be used to get a sense of which community members might work well in a group together, based on their careers, learning interests, and time commitments.

  Follow up with an e-mail or survey concerning student experiences with technology, distance learning, and collaboration. Individual e-mail messages to students might be appropriate with some students to determine their personality and work ethic. Appropriate grouping of compatible individuals will move the learners more quickly toward successful collaboration.

- ***Preinteraction.*** Begin the content activities with tasks that a learner can accomplish individually. This will give students time to get to know one another through the introductory exercises and to become familiar with the basics of the technology before adding the stress of coordinating activities with a peer or group. If students are not confident in the use of the technology, they will be slow to enter their thoughts or may not use the tools at all. Provide a space on the course Web site where technology problems can be posted for peers to read and assist with resolution. Preinteraction activities can include online lectures, readings, and reflection assignments.

- ***Interaction activities.*** It is good to plan about two weeks for new learners to become comfortable with the online Web course environment. Once students are comfortable, introduce an activity that requires interaction between two peers, such as having each one review the other's reflections or allowing them to question each other on factual or core content. As mentioned in an earlier section, this can be done via e-mail, chatrooms, or online notebook exchanges. Be sure to allow three to five days for this activity to occur in order to accommodate scheduling difficulties between the two learners.

- ***Collaboration activities.*** At this point, two or three dyads can be merged to form a recommended group size of four to six students (Harasim, et al., 1995). Balancing expertise within each group as much as possible is a worthwhile practice. Small group discussion is a good strategy for the groups to learn consensus building and begin forming interdependency by focusing on resolving a problem or dilemma.

  Set netiquette standards, or manners, for the community and allow community members to amend or appeal the rules as the community builds. See Harasim (1995) or an online site for helpful examples of netiquette rules.

  Keep after the lurkers who are not participating by assigning roles and responsibilities, such as summarizing a discussion. Call on them just as you would in class by asking questions in the conference area addressed specifically to the lurker.

- ***Cooperative activities.*** Effective face-to face cooperative techniques such as a jigsaw also work in an online environment. Jigsaw is a cooperative activity in which each group member has a piece of the knowledge content needed to solve a puzzle. Other small group strategies include roundtable discussions, role plays, and team projects that result in the creation of strategies for complex real life challenges.

In cooperative activities, assigning and rotating roles to team members throughout the semester is an effective strategy. Varying roles can assist learners in organizing themselves and developing self-direction. Several researchers have identified various roles over the years (Cohen, 1972; Rudduck, 1978; Brochet, 1989; Harasim, et al., 1997):

Leader or facilitator who helps set group goals, tracks group progress, and manages group activities

Negotiator who eases or resolves conflicts

Editor who summarizes the group's discussions and progress for the rest of the community

Consultant who researches and provides additional resources to the group

Pacesetter who encourages the cooperation and participation of lurkers

Challenger who encourages critical thinking by introducing questions or engaging group members in a debate of their position.

- *Online community activities.* Large group conferences and seminar groups are very effective online community activities. Student teams can be responsible for researching topics, presenting ideas, and soliciting feedback and ideas from the other learners. Many of the book sites mentioned in the earlier chapter on content resources offer synchronous events with experts. One community activity could be to participate in one of these online events and integrate that experience and information into the conference. The student team presents and facilitates the conferences. Sufficient time needs to be provided for the planning of these types of conferences.

  The time that a faculty member spends managing the online interaction should decrease as the course progresses and learners become more experienced with collaborative and community activities. Once a community is formed, it should be predominantly self-managed, meaning that community members take responsibility for initiating and coordinating activities. The faculty member then is able to step into the background and allow the community to govern itself.

- *The bottom line.* An online community is not something that simply happens. It must be developed and nurtured through diligent planning by the faculty. It also requires the commitment of the class community to make it work. However, the outcomes are well worth the effort. Similarly, effective collaboration and cooperative learning activities also must be developed and planned. These types of activities nurture student learning and are useful tools in creating effective online teaching and learning environments. Collaborative activities may also be among the best ways to help manage the time commitment of faculty for online courses. This is an area where more research and more tools will help make significant differences in future learning environments.

CHAPTER 10
ISSUES IN THE WEB ENVIRONMENT

Overview

Over the course of this book, we have addressed many of the issues that faculty and administrators are facing in the new online environment; however, we have not addressed them all. Strategies for dealing with many of these issues are still evolving, but the issues are complex and often challenge strong cultural traditions. Answers are few and far between; what we have now are temporary strategies to use while technology and practices are sorted.

Four recurring issues are the source of ongoing frustration for developers and managers of online courses:

- Managing e-mail communications with students
- Class size in online courses
- Copyright issues and intellectual property policies
- Assessment and evaluation

The quick pace of the online environment provides little time for the exploration or resolution of these issues. Our discussion is only a starting point.

Issue One: Managing E-Mail Communications with Students

The subtitle of this section could be "What NOT To Do When Communicating with Students on the Internet." In the spring of 1997, when one of the authors, Judith Boettcher, was new to teaching via the Internet, she blithely decided to handle almost all the communication with her students online. Her story of this experience and the lessons she learned from it follows.

Because I was teaching a campus course about distance learning, I thought it was important that the students and I practiced what I preached. So it was that in the middle of a beautiful spring Sunday afternoon, I found myself staring moodily at the contents of my Eudora Inbox, wondering why I had ever decided to handle all communication with my students myself. The latest assignment from my students was a project description. After two hours of trying to sort my e-mail into some semblance of order, I still had not found the project description from 5 of my 29 graduate students!

Every one of my students, it seemed, had managed to create a different name for the subject heading of their mail files. These same students, later in the semester, sent their completed projects to me in every imaginable file format. They also sent files to me, I later learned, with obscure viruses that were difficult to eradicate. Seven students were quite inexperienced in the use of technology at the beginning of the course, which added additional spice to this mix.

To my surprise, I soon added myself to the "inexperienced" list. I learned that I really knew very little about managing course delivery over the Web or communicating with students using this new teaching and learning environment. I learned that actually doing this type of teaching is definitely more challenging than just talking about doing it. What follows is a reflection of what I learned from facing the perils of faculty-student communications online. It takes the form of a list of things not to do when communicating with your students over the Web.

1. Do not expect all students to read and participate successfully in your class discussion list during the first week of the semester. The processes for setting up class discussion lists and giving all students e-mail access have not been fully automated in many higher education institutions. For those institutions that are using some of the new tools, this situation is improving and may have become automatic.

For other institutions, and especially for students at a distance, a lag of one to two weeks for all students to be prepared with the technology is not unusual. In planning online courses, then, some backup strategies may need to be identified.

Two areas may need support. First, access to course content must be assured and reliable. With distance learning students, a good strategy is to have students support each other in providing access to the content information. Sufficient technology support is another critical piece that must be in place. For solving technology access problems, a lag of two weeks is usually sufficient. Direct students to the institution's help desk and the local Internet Service Provider (ISP) if an external one is being used. Students can also successfully team up with each other to resolve technology problems.

2. Do not be vague about the names of assignments. If you want your students to turn in assignments via electronic means, be very specific about what should go in the subject line of a message. In fact, you may want to develop a simple algorithm for naming these files. The algorithm might have three parts, such as "Assignment 1: Theoretical Principles, Student Full Name." For a project sequence, you might want to develop a subject, such as "Project Prospectus," "Project Summary," or "Course Summary Paper." To ensure that the assignment name students are to use is always accessible, this information can be directly available from the course calendar on the Web.

The first part of the subject heading eases the use of the filter feature of many e-mail programs, automatically filing the assignment e-mails into the special assignment mailbox. The second part of the algorithm, the content name, makes it easy to sort by subject once the messages are in the appropriate mailbox and may help keep the learning objective evident.

You may wonder why am I suggesting that students include their full name in the subject heading. The e-mail identifiers students use may not even remotely resemble their real names and students may not be using the signature block feature available on many e-mail packages. Having students include their names in the subject heading is actually an updated version of the ancient plea to put their names on their papers. When we used paper, we often had a student's handwriting to clue us into his or her identity. Now faculty detectives have to search through e-mail logs or other lists for matching e-mail.

3. Do not be available to your students all the time. Many dedicated and committed faculty truly enjoy teaching and want to be available to their students through this new medium. Additionally, as we move some of our teaching and learning to this new environment, we are constantly reminded that the power of technology enables us to be available anytime, anywhere. Consequently, many students expect faculty members to provide answers and responses to e-mail questions immediately. We are becoming increasingly aware of how rapidly technology is moving and how slowly our bodies and minds are adjusting to the use of technology. Just because it is possible to be available 24 hours a day, 7 days a week does not mean we have to be, or should be, available anytime, anywhere.

You can manage response expectations from the very beginning of the course by following these five suggestions:

- Set up a framework for turnaround time for response to e-mail. Usually saying that you will attempt to respond within 24 hours is considered reasonable.
- Announce that there will be times when the 24-hour response time will be suspended. This includes weekends, announced vacations, conferences, and unexpected emergencies. You also agree to announce to the students when this response time will be suspended. It is not always easy to access the network from anywhere, anytime. Even though we see World Wide Web addresses advertised everywhere, only about 20 to 25 percent of the population is linked to the Internet.
- If you choose, you can set times at which the 24-hour response time will be even shorter, particularly just prior to deadlines. Some faculty set e-mail office hours when they will be actively monitoring and responding to student messages.

- Set up a contract with students that when they send an e-mail with a question or comment that you feel is of general interest and value to the class, you will respond with a general note to the entire class. Responses to these questions can become the basis for additional course guidelines and frequently asked question (FAQ) lists.
- You may want to remind your students that your faculty role includes more than teaching responsibilities.

4. Do not assume that electronic mail is received or read in any specific time frame. Internet communication is a new medium. It is not as fast or as immediate as a telephone conversation or a fax, nor as slow as the postal service. When we send electronic mail, it moves in discrete packets over a local network and through numerous gateways and other networks before it is received by the addressee. We have all heard of letters being mislaid in post offices or warehouses and finally being delivered after 20, 30, or 40 years. E-mail can be similarly delayed or totally destroyed. Therefore, do not assume that your mail will move rapidly or at all, or that it has been successfully received and read by the addressee. Because the possibility of lost or delayed e-mail exists, asking for a confirmation e-mail on time-sensitive or critical messages is wise. Setting up an automatic confirming reply when an e-mail is received is another option.

5. Do not structure the communication flow in a course so that you are the hub of all communications. This will save you time and create a better learning environment. Part of the power of the Internet communication technology is that students and faculty can craft a true learning community in which dialogue and communication flows in all directions. Some faculty members set up online problems, dilemmas, and seminars in which students launch, manage, and summarize a discussion or solve a problem.

The faculty role in some parts of a course is not to lecture, but to monitor and mentor student discussions or problem solving. In these cases, faculty may choose to compose a response, analyze the content, and provide feedback on a weekly basis to ensure that students stay on track with the development of content and ideas. In this way, students interact with each other and test and hone their ideas with their peers.

6. Do not forget to provide feedback and evaluation of student progress and learning. Although we all want to believe that students are taking courses because they are intensely interested in learning the course content, in fact students are also there to earn their grades and meet program requirements. Consequently, students want timely and personal feedback on the work they do.

Al Oosterhof, a faculty member at Florida State University, developed a method for providing timely feedback with the use of word processing and spreadsheet software. A paper by Oosterhof on this approach is be available at <www.cren.net/community/index.html>.

Grading and providing feedback to students is an area of opportunity for Web course management tool vendors and other software developers. One topic that generated much discussion at a distance learning seminar was techniques on reading, evaluating, and correcting electronic student documents. Some faculty are experimenting with the use of audio files for feedback on papers, finding that spoken comments can be completed more quickly than can written ones.

7. Do not put anything in your student correspondence that you would not want to see on the front page of a local or national newspaper. There are still many legal battles brewing about ownership and privacy of messages in the workplace. There are also many perspectives about the wisdom and difficulty of deleting computer files. So it is best to assume that at any time, course content, including e-mail messages and other course materials, could become public in a broader sense of the term.

To borrow a quote from the Newseum in Washington, D.C., "If you don't want to read about it in the newspaper, don't do it." For faculty and students, we might adapt it as follows, "If you don't want to read about it in the newspaper, don't write it."

8. Do not go unprotected from viruses. Update your virus protection software regularly and often. If you choose to run your machine unprotected from viruses, be vigilant about the attachments you receive from students and others. Do not open or execute any suspicious files.

A number of helpful resources are emerging to assist in improving electronic communications. For example, look for articles on netiquette for students in online courses. The 1997 book, *Learning Network*, can help guide both the design and delivery of Internet courses. The book provides useful information on issues of faculty time management and student evaluation. *Teaching at a Distance: A Handbook for Instructors* (Boaz et al., 1999), available from the League for Innovation, is another useful tool for faculty who are designing and implementing technology-based learning.

Issue Two: Class Size in Online Courses

As faculty are gaining experience with teaching and learning online, they are also discovering that they are spending more and more time interacting with their students. A key determinant of how much time they spend is the number of students in their classes. Suddenly 30 students, a common on-campus class size, is overwhelming faculty online. Questions about the optimal size of a Web course are being asked more and more often.

One reason for class size concerns involves the communication pattern in the new Web environment. In the classroom, well-defined patterns of communication exist. The most accepted pattern of communication is primarily from the faculty to the students, and from the students back to the faculty. This is a very efficient model of communication. The teacher is speaking to 25-30 students at the same time, and their eyes and body language communicate the extent of student attention and understanding. In this environment, the faculty member is often assumed to be the one and only expert. We are still strongly influenced by this concept of the faculty member as the lecturer dispensing information to the students. ITV classrooms, telecourses, and talking head presentations on the Web reinforce this model of knowledge flowing primarily in one direction.

In the online environment, the lines of communication are more divergent. We have a fully linked network of communication lines, including threads among all members of a Web course community and among multiple groups of students as well. This network pattern of communications between faculty and students and between and among students creates a powerful tool for inviting and supporting student involvement and thinking. Students are more likely to contribute their experiences, share their insights, and frame thoughtful, reflective questions with this new network of communication. Therefore, the course process of creating a knowledge community among the student group and a knowledge base within each individual springs from many more sources. Expertise can come from many directions, but confusion may also be more prevalent. This confusion often may become a step in developing knowledge and can highlight needs for more content development. Given this network pattern of communication, it is possible that faculty members will spend course time listening and reflecting on thoughtful questions and analytic comments.

Must Faculty Spend More Time?

We have sprinklings of anecdotal evidence that faculty spend not only more time with online courses than with campus courses, but that they spend *significantly* more time with their sections of online courses. In a Web posting (11/20/96), L. Estabrook, Dean of the Graduate School of Library and Information Sciences at the

University of Illinois, notes that a faculty-student conversation during a class break can take 30 seconds while that same information may take two to three minutes to exchange in an e-mail message.

One useful approach to measuring the amount of time faculty are spending on student and course communication is to try to estimate the amount of time that a given faculty member spends with each student over the course of a semester. Early estimates of about two hours per student, including student testing and evaluations but not lectures or preparations, have been rejected by some faculty. In a presentation on this topic in March 1998, Frank Jewett of the California State University System Office noted that although the two-hour per student figure has been rejected, sometimes vigorously, if one calculates the number of hours per week in a semester, divides by the number of hours available for student interaction, and then by the number of students, it becomes apparent that two hours is about right. It is simply not possible to spend much more time than that. We may feel that we need or should spend more than two hours per student, but there are simply not enough hours in a semester to do so. It is no wonder that faculty often feel stressed by the demands of online teaching, student communications, and student evaluations.

Increased Faculty Workload

Analyzing the question of student enrollment in a Web course leads inevitably to questions about faculty pay, workload, and working conditions. As early as 1990, Murray Turoff, in a foreword to a book on online communication, noted that "the workload for faculty is linearly dependent on the number of students" (Harasim et al., 1997, p. xii.).

Some distance learning programs are implementing new salary policies to acknowledge the extent to which larger numbers of students impact faculty workload. In a posting to the American Association for Higher Education listserv (11/24/95), Bill O'Neill of Southern Utah mentioned two examples worthy of note. In one university engineering program, an additional $150 per student was added to a faculty member's salary for every distance learning student, plus an additional $50 per student was sent to the department's budget. At one state university, faculty teaching distance learning courses received a $100 bonus for each student once the enrollment exceeded 25. In another example, in a library information program on the East Coast, faculty received an additional $50 per out-of-state student enrolled in the course.

In the classroom models of learning, faculty workloads in many institutions are based on formulas yielding 10 to 12 hours a week for every class or section taught. In some institutions, however, the number of hours per week can be as low as four hours. The baseline number of students is generally 25 to 30 students. If class enrollment reaches 40 to 50 students, faculty are sometimes able to negotiate for additional support for the class.

These classroom models and their associated workload estimates are built on what might be called the bundled model of course production in which faculty do everything related to their own course. They design, develop, and deliver a course. The delivery includes meeting with students on a regular basis, preparing and giving lectures, directing group work and learning experiences, and evaluating students.

In distance learning course production, a different model is generally used. Rather than one faculty being responsible for design, development, and delivery, the faculty member is often only responsible for a portion of the entire process. Currently, our Web courses are neither fish nor fowl. They are like campus courses in that faculty do everything associated with the course; they are like distance learning courses because the students are not generally on campus. So we have an additive model in terms of workload. Faculty do everything they have been doing plus all the personal communication with the students online. And, it is all being done with new tools that faculty don't know very well and with increased expectations by students, administrators, and legislators.

New Tools, New Models

The next wave of technology, including networking and camera imaging, will alleviate this situation to a degree. Small cameras attached to computers may encourage faculty to return to the mode of synchronous office hours so they can talk rather than write to students. These tools may help improve the communication feedback loop.

So where does that leave us in answering the question of student numbers in a Web course? We may be moving to the Web only to find that we can handle fewer, not more, students effectively.

This is a curious phenomenon. The ability to put courses on the Internet caused us all to speculate that master teachers from the top research universities would be able to reach hundreds, even thousands of students. Now, experiential data is suggesting that the maximum number of students for online courses is really very low, ranging from 12 to 20 students, depending on the level of interaction with the faculty member. Some experiences seem to suggest that Web courses can support larger numbers, in the range of 25 to 65 students, for courses that are focused on training, certification, or professional degrees.

Necia Miller of Rose State College in Oklahoma is a member of a faculty committee that worked on a class size in online courses proposal for the college administration. This group sought a recommendation for online class size to be no more than 20 students. One member of the committee wanted the recommendation for class size not to exceed 18. The difference between 18 and 20 seems minimal and insignificant at first glance, but if we estimate that every additional student requires at least another two hours of faculty time, based on current models and expectations, even an increase of two students in one course makes a difference. Multiplied over a series of courses, it becomes substantial.

Wayne Hall, from San Jacinto College-Central in Pasadena, TX, said that he also is "doing battle over class size." At this time, he believes that 15 students should be the maximum limit for Internet courses. He has reached this belief after having taught psychology classes on the Internet since 1996. He has taught 20 students for four semesters, 30 students for two semesters, and 39 students for one semester. At this writing, Hall has two sections with a total of 49 students. He is searching for a way to recommend to administrators "a more realistic number of students for Internet courses." Hall has reached this point while serving in a dual role as a department chair and a faculty member, so he understands both sides of this debate.

Mary Emerson from Collin County Community College in Frisco, TX, is asking the same question on behalf of her computer science department, which is in the process of setting standards for this environment. Mary commented that their traditional on-campus classes are limited to 30 students, but that instructors who have been teaching computer classes of 30 over the Internet are finding them to be "very, very time intensive."

At another institution, the faculty and administration agreed that 15 would be the number of students a faculty member would have when teaching an online course for the first time, and that subsequent courses would increase to the regular on-campus level of 30 students. This is good in that it provides some learning time for faculty and students. Another, less optimistic view is that it simply delays addressing the real problem, which is that our current class model needs to be substantively redesigned for online environment. However, we cannot be certain about that yet. Other faculty are finding ways to run Internet courses with more students. One faculty mentioned that she was handling 37 students, but only 32 of whom are really engaged in online processes.

Marie A. Cini from Duquesne University suggested that the challenge of managing many students online is that "we are still hung up on some form of contact with the instructor as the model of instruction." Marie goes on to say that one of her biggest goals when teaching online is to wean students from dependence on her and to "point them towards one another." She believes that the "right" number of students in a Web course will grow because the expectation that instructor contact is paramount will decrease.

These numbers are far from the much larger numbers originally dreamed of by administrators and legislators. Other technology-based models of distance learning have supported very large numbers of students by using mass delivery methods. Telecourses can be beamed to hundreds, and even thousands, of students. Closed circuit television and interactive video classes often support numbers ranging from 40 to over 200 students.

Traditional distance learning professionals have thoughts on the expectations of students for interaction with faculty in a course experience. A project by the Western Cooperative for Educational Telecommunication, <www.wiche.edu>, resulted in the development of a set of Principles of Good Practice for Electronically Offered Academic Degree and Certificate Programs. These principles were also adopted and enhanced by the board setting up the new Southern Regional Electronic Campus (SREC), <http://www.sreb.org>. The following statement is under the section on curriculum and instruction: "The course provides for appropriate interaction between faculty and students and among students" (p. 24). The faculty support section of the principles from the SREC follows with, "The program or course provides adequate equipment, software, and communications to faculty for interaction with students, institutions, and other faculty."

How Many Students Are "Just Right" in a Web Course?

In the U. K.'s Open University, a new online master's degree course in distance learning will have a maximum of 15 students. At Regent University in Virginia, the maximum number in online Ph.D. courses in communications is 12. The master's program will have larger numbers, possibly in the 50 to 60 range. Linda Harasim from Simon Fraser University recommends that 20 is about the right number for upper-division communications classes.

Stories about Web courses with 50 to 60 students are emerging. Some of these courses are programs designed for acquiring what is known as professional credentials rather than traditional academic degrees. Other projects are starting to reach students in the 200 plus range, but those courses are highly automated and have such features as tutorials and online testing.

Three major instructional design questions must be answered before deciding on the optimal number of students for a Web course:

- What are the goals and objectives of the course?
- Who are the students and what kind of educational experience are they expecting?
- Is the faculty member ready, willing, and experienced with Web instruction?

What is the optimal size for online courses? There is no one answer at this time. We will continue grappling with this issue for some time, for several reasons:

- Our campuses are implementing the tools and infrastructure for this environment. The environments are still in flux and not optimized.
- Students are now learning how to use these tools and how to learn in this environment. They are also learning to be more active learners and to be less dependent on the faculty member.
- Faculty are also spending time on learning the technology and often feel they are losing significant teaching time to teaching and learning bits and bytes rather than content.

While keeping in mind that things will change, it's possible to offer a basic recommendation for the next two to four years: start small! Probably 10 to 14 students is a good number to start with for a fully online WebCourse. This provides learning time for the faculty member and the students. Be aware, however, that a real danger exists with starting small. Habits and strategies of teaching and learning that work well with small groups do not necessarily scale up very well.

What we think would be helpful at this time for our community is a definitive research project that experiments with a "Megacourse" on the Net that is similar to very large lecture classes in the hundreds on our campuses. With such a project, we might be forced to learn more about how to scale up for large numbers of students. We know we need better tools for both faculty and students. We will not learn this very quickly while keeping classes very small. Such a project, however, would be a very risky approach. A team of faculty, a comprehensive infrastructure, understanding administrators, and understanding students who are willing to experiment in this way would all be needed.

Fundamental Questions

The issue of class size in online courses is causing us to look at basic issues we have not discussed for some time in higher education.

- Expectations of students: How much access and interaction with the faculty member is appropriate for the class content and goals?
- Expectations of faculty: How much time should a course take under our current model and under the new model? Is it time to look seriously for strategies that will help us deliver online learning more efficiently while reducing the faculty burden?
- Expectations of administrators: What size classes and what types of courses do we offer our students while maintaining and developing our desired institutional image?
- Expectations of society: How can we change the model to achieve quality, low cost, and high satisfaction for all?

We might also consider that we haven't come very far in the science of teaching if a teacher is always required. In what alternative form might the teaching function be constituted? In what other forms might courses be offered? While it may not be something we want to consider, we may have to put some creative thought into how we can use technology to structure and deliver really great learning experiences with less effort on the part of a teacher. If we continually design and redevelop the same course every semester, are we not still a cottage industry in how we design and deliver learning? Must we always do it this way?

(Note: Thanks to Don Ely from Syracuse University, Frank Jewett from the Cal State System Office, and Robert Schihl from Regent University for sharing their ideas and thoughts on this topic. Thanks also to Marie A Cini, Mary Emerson, Wayne Hall, and Necia Miller for their input and communications.)

Issue Three: Copyright Issues and Intellectual Property Policies

Copyright has always been an important issue in distance learning and is now assuming new importance in the Web environment. Questions surrounding the ownership of academic courses and faculty retention of copyright of their research publications are discussed with increasing frequency. The topic of intellectual property is a hot one in the world of educational technology. Our discussion provides general information regarding copyright issues, and we encourage any faculty member who has copyright questions to consult his or her institution's policies and guidelines or to seek legal advice from appropriate professionals.

Looking at Copyright: User or Owner?

Faculty generally want to be knowledgeable about copyright from two different perspectives:

- Using materials copyrighted by others for teaching, learning, and research
- Developing materials copyrighted by themselves, the institution, or publishers

All the rights and privileges of copyright owners in the U.S. are based on copyright law that has its origins in the U.S. Copyright Act of 1790. The document that has been the basis of the current law dates from October 19, 1976, with a number of minor revisions added over the last five years. A new copyright act was passed in 1998, the Digital Millennium Copyright Act, to address the new possibilities not previously envisioned. Questions about the use of copyrighted materials in online and distance learning environments are still being debated.

The sections of the copyright law that are most pertinent to teaching and learning from the 1976 law are Sections 106 to 118. Copies of the Copyright Law are available from the Copyright Office in Washington, D.C. and from the office's Web site at <http://lcWeb.loc.gov/copyright>.

Section 106 of the copyright law quite clearly states that copyright owners have certain exclusive rights:

1. Reproduction of the copyrighted work
2. Preparation of derivative works from the copyrighted work
3. Distribution of copies of the copyrighted work to the public
4. Performance of the copyrighted work publicly
5. Display of the copyrighted work publicly
6. In the case of sound recordings, performance of the copyrighted work publicly by means of a digital audio transmission

There was serious discussion about adding the sole right of digital transmission to the list of rights of copyright owners. This could have effectively made the use of many electronic mail lists illegal. That right was not added, but it is important to watch the progress of copyright discussions.

Section 106 also specifies for items 4 and 5 that these rights pertain to literary, musical, dramatic, and choreographic works; pantomimes; and pictorial, graphic, or sculptural works, including the individual images of a motion picture or other audiovisual work. These rights, as specified, clearly reserve the right for visual and sound images to the copyright owners. Hence, Web sites with visual and sound images that belong to various movie and television studies are restricted in their use. For example, this means that commercial Web sites with images of Star Trek characters and sound clips may be in violation of the copyright owners' rights, particularly if they are used without permission. What about such use for teaching and learning purposes?

In practice, copyright owners do not sue for every violation. Most copyright suits are brought when significant amounts of money are involved, or when it is perceived that the use of copyrighted material harms or damages the image or reputation of either a copyright owner or the copyrighted work. Higher education institutions can still be very vulnerable. Therefore, faculty need to be aware of the real possibility of lawsuits from the illegal use of copyrighted materials.

Fair Use for Educational Purposes

What about the fair use doctrine for education? Every academic is somewhat familiar with the concept of fair use, but generally not familiar enough. Often, fair use is interpreted much too broadly, as if any use of copyrighted materials is all right, so long as the material is being used for teaching and learning purposes.

Section 107 defines the Doctrine of Fair Use, a legal principle that sets the limitations on the exclusive rights of copyright holders. This section says the following:

> Fair use of a copyrighted work . . . including reproduction . . . for purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research, is NOT an infringement of copyright.

However, we must note that "fair use is not free use." Section 107 then provides some criteria to provide guidance in interpreting this right of fair use. There are four criteria used to evaluate whether a user of copyrighted materials can claim fair use. These criteria center on the use of the work and the characteristics of the work and include the purpose for which the work is being used, the nature of the copyrighted work, the amount or substantiality of the portion to the whole, and the effect on potential market or value of the work.

The first of these criteria is that of purpose. If the purpose for using the copyrighted work is commercial use, then generally, permission for use must be obtained. This criterion must be applied in the following example. If faculty incorporate copyrighted material into educational materials and then sell those educational materials commercially for profit, this is not fair use, as the faculty will benefit from the copyrighted material with no compensation back to the original copyright holder. If the purpose for using copyrighted work is nonprofit use, as educational or research use is generally considered, then fair use can usually be applied.

The second criterion focuses on the nature of the work. If the work is nonfiction or simple factual material, then it is easier to use the copyrighted work without explicit permission. It is more difficult to claim copyright violation for a diagram showing the process of osmosis, for example, than for a diagram of a fictional invention. It is difficult to prove that some factual material is unique, belonging solely and only to one individual.

The third test is that of the amount of copyrighted work being used. This criterion involves the percentage of the work being used in relation to the entire work. The easiest way to remember this test is to think of a ten-line poem. Generally, use of a small portion of a copyrighted work is permissible provided other tests are met, but use of a large portion is not allowed. Thus, use of the complete ten-line poem would need permission, but ten lines from a much longer work might not.

The fourth test is that of market value. Does the use of the copyrighted work without permission damage or restrict the copyright owner from appropriate compensation for the intellectual work? This is the argument often used in the area of software piracy, for example. Software publishers claim that their revenues are significantly lowered if their software is shared among groups. Publishers of academic journals often make this same claim when their works are placed on reserve and students make photocopies for themselves.

Additional Guidelines on Fair Use

Additional help in interpreting Section 107 appeared in a discussion of fair use in a House of Representatives report from September 1976. That report noted that, "despite the fact that the courts have ruled on this 'fair use' doctrine many times over the years, no real definition of the concept has ever emerged," and "as the doctrine is an equitable rule of reason, no generally applicable definition is possible, and each case raising the question must be decided on its own facts."

However, this House report provided three additional tests or guidelines to be used in interpreting the doctrine of fair use. To apply under the fair use doctrine, use of copyrighted material must also meet the three tests of brevity, spontaneity, and cumulative effect.

Brevity refers to the percentage to the whole criterion just mentioned. This reaffirms that short segments are more acceptable than longer segments. The next criterion is that of spontaneity. If a faculty member decides to use material for educational use, and there is, reasonably, not enough time to seek and receive permission, then fair use generally allows use of the material for that one time. However, faculty may be at risk if they use the same material over a number of semesters for key parts of their instruction without asking permission. This guideline suggests that sustained use over a number of semesters is not fair use. Finally, the guideline of cumulative effect suggests that multiple copying by faculty over the course of a semester needs to be restrained. Cumulative effect also refers to the number of items that can be used from the same author or collection.

Fair Use Guidelines for Educational Multimedia

In order to address the difficulties in interpreting the fair use guidelines, especially in light of the rise of digital media capabilities and the almost effortless distribution on the Internet, the Consortium of College and University Media Centers (CCUMC) worked with a number of organizations to produce a set of guidelines specifically for the use of multimedia for instruction. The complete set of Fair Use Guidelines for Educational Multimedia is available at <http://www.indiana.edu/~ccumc/mmfairuse.html>. A videotape discussing these guidelines is also available.

Faculty often find most useful the section that specifies the portion of copyrighted material, by media type, that can be used within fair use guidelines. Some people argue that these portions exceed fair use; others argue that they are too restrictive.

Fair Use Guidelines Portion Control for Media Types

- Motion media: 10 percent or 3 minutes, whichever is less.
- Text: 10 percent or 1,000 words, whichever is less.
- Music: 10 percent of individual copyrighted musical composition, or 10 percent of the composition embodied on a sound recording. No more than 30 seconds.
- Illustrations and Photographs: Fair use usually precludes the use of entire works. In any one multimedia program, no more than 5 works from any one artist or photographer. From a collective work, no more than 10 percent or 15 images, whichever is less.
- Numerical Data Sets: Up to 10 percent or 2,500 fields or cell entries, whichever is less.

While these guidelines were adopted by the consortium and the cooperating organizations, the Conference on Fair Use chose not to adopt these guidelines. Part of the reason for the dissension was that the rules for distributing and using materials for distance learning were so restrictive that they effectively blocked the ability to design many types of distance learning programs.

Ownership of academic courses is a complex issue. In the traditional model of on-campus courses, the question has rarely been asked. In the traditional distance learning model of courses, however, in which a team of faculty have developed the course, the answer would likely be that the institution that provided funding for the course owns the course. In fact, a course is difficult to own or even to copyright, because intellectual work is only subject to copyright when "the work is created and fixed in a tangible medium of expression." Much of what constitutes a course is not "fixed in a tangible medium of expression." Perhaps only components of a course, such as a book, Web site, or set of exercises, can be copyrighted.

Some institutions follow the policy traditionally called "work for hire." This means that any work done by a faculty member while under contract belongs to the institution. Other institutions have a policy about joint ownership and revenue sharing similar to patent agreements. Other times the faculty can negotiate to retain all copyright, including that for instructional materials. This is most often the case with textbooks. At any event, the time to discuss the ownership of any instructional material is before the project gets underway. Some distance learning projects involve a negotiated agreement between the faculty, the institution, and the publisher.

What abut the other question: "Should faculty retain copyright ownership of their research publications?" We all have become accustomed to a model in which faculty write research articles, submit them for publication, and then an institution purchases the research journals that publish the articles. In this model the faculty turn over the copyright of the articles to the publisher in return for the publishers' work in reviewing, editing, publishing, and distributing the work.

Two trends are causing higher education administrators to question this model. One trend is the steadily increasing cost of academic journals. The cost of many journals has become prohibitive, and institutions find it difficult to purchase the journals in which their own faculty have published. A second factor is the increasing time it takes to ensure that the faculty are staying within the copyright rules regarding their own materials. The provost of the California Institute of Technology, Steven E. Koonin, made headlines on September 18, 1998 (*Chronicle of Higher Education*, p. A29) when he proposed that faculty no longer hand over the copyright for journal articles to publishers. Subsequent discussions noted that this idea had been suggested in March of the same year by a group that published their views in an article available at the Association of Research Libraries (ARL) site. A letter to the editor from a senior vice president at Elsevier, a well-known academic publisher, suggested that the publisher added value through managing the review and editing process and that a distinction exists between the submitted manuscript and the final edited paper. Faculty retained the right apparently to putting the submitted manuscript on their own Web site.

In practical terms, what does all this suggest? Faculty, as they become knowledge entrepreneurs, should consider negotiating with publishers for a new set of rights concerning faculty work, including the following:

- Copyright ownership for their own teaching, learning, research, and speaking engagements. This would include the right to copy, distribute and perform their own work without needing to ask permission.
- The right to include their material on their personal and course Web sites.
- The right, on behalf of the institution, for other faculty at the institution to use the work in similar ways.

Joint copyright ownership of teaching and learning materials may or may not be reasonable. But it is important that we find ways to acknowledge the right of a faculty member to his or her own work, and the right of an institution for reasonable access to the work of faculty members.

Resources on Copyright

There are multiple Web sites on copyright laws, starting with the Copyright Office itself, <lcWeb.loc.gov/copyright/>. The following Web sites also provide information about copyright laws.

<www.indiana.edu/~ccumc/copyright.html> provides the full set of guidelines on Educational Multimedia. It is part of the Web site of the Consortium of College and University Media Centers (CCUMC).

<www.utsystem.edu/OGC/Intellectualproperty/cprtpol.htm> is a good place to start, and includes an example of a copyright policy at a large state system.

<www.indiana.edu/~ccumc/mmfairuse.html> provides information about the Conference on Fair Use.

<www.public.iastate.edu/~mikealbr/links/copyright.html> is a general copyright link list.

<www.arl.org/scomm/pew/pewrept.html> provides the ARL article on publish or perish.

Issue Four: Assessment and Evaluation

Questions about assessment and evaluation are often most troubling in cases of online and distance learning when it is difficult for a faculty member to get to know each of his or her students. The probability and ease of fraud and deception can often be a major concern. However, as we look more closely at assessment and evaluation of students and programs, we find creative ways of addressing most of these concerns.

We could talk a long time about assessment and evaluation. There are a number of good initiatives underway on the use of technology for improving teaching and learning. The Teaching, Learning, and Technology (TLT) Group's Flashlight project, <www.tltgroup.org>, has as its goal the development of training and evaluation tools that guide effective uses of information technology.

This section is an assortment of useful thoughts on assessment and evaluation. Thanks to the participants in various distance learning seminars over the years for many of these ideas.

Questions of which technology is most effective in supporting learning have been with us a long time. When the book came on the scene in the 16th century, faculty lecturers worried that their students would no longer have to come to class. When the public library became a presence in small communities across the country, it was thought that the knowledge of the world was freely available to all. Now faculty and administrators are concerned that if the content for a given course is on the Web, students will not come to class. We have discovered that students come to campus and to class for something other than content. They come for the experience, for the networking, and for the speed, support, and structure that a faculty member and a class provide.

During the next decade, we need to decide what to measure and how to measure it. To bridge the gap in assessing and evaluating students in online courses, consider the following options.

- Instruction can be designed so that students' knowledge and skills are gradually developed and revealed over time. Some faculty members do this by using strategies we discussed in the section on collaboration. Other commonly used strategies include multiphasing project requirements so that the steps in the development of the project are evaluated along the way rather than solely at the end.
- For students who must meet internship and mentoring requirements, some programs set up tutors and mentors who are located geographically closer to the student. The mentors are often graduates of the same program.
- Some of the Web course management tools come with modules that make designing short quizzes easy. Faculty use these types of tests to build competencies and provide practice; other tests can be delivered at proctored local sites. Students who are within commuting distance can be required to come to campus one to three times a semester for testing and evaluation.
- As the infrastructure for electronic commerce develops, it will be able to provide security for completing tests and evaluations at a distance. Videoconferencing also supports security in testing.

The development of technology for easy and effective assessment and evaluation is lagging behind other software technology, but that may not be problematic. As we in higher education move to more customized learning and to an emphasis on collaborative and constructive teaching and learning, the type of evaluation that we will want to do online will probably change. The tools that we will need then are not the tools we think we need now.

In closing, the Principles of Good Practice adopted by the Southern Regional Education Board that are being widely adopted by electronic campuses recommend the following good practices in the area of evaluation and assessment. Note the emphasis on the evaluation of the program itself, in addition to the student evaluation. Student and faculty satisfaction are also being measured.

- The institutions evaluate program and course effectiveness, including assessments of student learning, student retention, and student and faculty satisfaction.

- At the completion of the program or course, the institution provides for assessment and documentation of student achievement in each course.
- Program or course announcements and electronic catalog entries provide appropriate information.

The fact that program and course announcements are being evaluated is worth noting. If students sign up for a course or a program expecting one set of outcomes and experiences, and later learn that the program and experiences are very different than they expected, the level of satisfaction of the student will be very low. The student will perceive the program to be of low quality because it did not meet the particular set of expectations that were created by the announcement. It may become higher education's version of truth in advertising.

Concluding Thought

This chapter has addressed issues that are of great concern to both faculty and administrators. As we evolve the new teaching and learning paradigm, we need to depend on the mutual understanding of institutional priorities and focus on appropriate educational experiences for our constituents to develop reasonable strategies for addressing these issues.

Note: Many issues discussed in this chapter had their origins in columns and articles that were published in Syllabus over the years from 1997 to 1999. For more information, visit the Syllabus Web site, <www.syllabus.com>.

CHAPTER 11

PERSPECTIVES ON THE FUTURE

By Judith V. Boettcher

Overview

Where will we be in teaching and learning in higher education in the year 2007? Will we know what it is to be a learning, rather than a teaching, enterprise? Will we have come to terms with the role of technology in learning? Will we know more about how to assist the learning act? Will we have sorted out and accepted the many roles of faculty? Will we be comfortable with the role of the for-profit education companies? Will an entirely new type of institution, focused on updating the professional needs of adults, be solidly in place?

No doubt, we will inch our way closer to these answers over the next eight years. After all, the future is always clearer once we are there.

This chapter has two very different sections. In the first section, I use data points to predict, suggest, and anticipate what higher education might look like in 2007. This first section looks at the higher education enterprise from six different perspectives. It is similar to taking a walk and watching the world as it subtly changes with each step. The shifts in perspective are small but significant. Like the kaleidoscope, virtually all the elements of teaching and learning enterprise will be there, but they will assume strange and unfamiliar shapes.

The six different components of higher education addressed are: (1) the higher education enterprise as a whole; (2) degree programs and continuing education programs; (3) the institutional infrastructure; (4) faculty and student tools and roles; (5) content resources; and (6) research in learning. Because we looked at each of these in some detail earlier in the book, these are broad brush predictions.

The second part of the chapter is a fantasy about what learning might be beyond the year 2007. Having been an aficionado of science fiction since my youth, I am drawn to thinking about what comes next for the education profession. In fact, the turning point of my interest in the future of education came while I was in the doctoral program at the University of Minnesota in the late 1970s. I was required to take a class in either the history or the future of education. I figured that one could always go to the history books to see what had happened in the past–with an apology to historians for their very needed perspective! However, I wanted to explore, contemplate, and discuss the future of education. From that point on, the future of education, specifically the influence of technology on the teaching and learning process, became my lifelong passion and interest.

The fantasy is called "Student-Centered Learning in the Lasting Experiences Ltd. Holodeck: As Good as It Gets!," and was first published as a column in *Syllabus* in June of 1998. A "holodeck," a creation of the Star Trek television series, is a three-dimensional simulated environment in which people can interact fully with computer-created special effects creating a real experience. The thoughts in this chapter are intended as both playful and serious. I hope that you will enjoy reading it as much as I enjoyed writing it.

Forecasting into the Future of Teaching and Learning

Science fiction writer William Gibson described our adoption of technology and the world we create as a result when he said, "The future is here; it is just not evenly distributed." As we look at each of the six major components of the higher education enterprise, the prediction statements will all have some wiggle room to account for this uneven distribution of the future. For example, some institutions are already mandating that all courses have a Web presence of some type. Therefore, some institutions will move forward quickly in these various areas, aggressively embracing the new environments, new tools, and new processes, while other institutions will be more conservative and move forward more slowly.

The Higher Education Enterprise and the Big Picture: The First Set of Predictions

- A new category of higher education institution, the career university, will evolve to meet the needs of the working professionals.
- National and global partnerships will be common and will extend institutions' specialties around the world.
- The size of the higher education enterprise will grow dramatically, and the greatest growth will be in nondegree and learning professional areas.

The higher education enterprise as a whole will change dramatically over the next ten years. The greatest changes will arise in response to the greatest needs: working adults who need to increase their knowledge base, upgrade their skills, and change careers multiple times during a lifetime. These working adults range in age from 24 to 74 and generally hold bachelor's degrees. To meet the needs of these individuals nationally and globally, we will see universities and colleges creating new colleges and virtual campuses. This is already starting. We see organizations such as Penn State's World Campus <www.worldcampus.psu.edu>, Western Governor's University <www.wgu.edu>, and the Southern Regional Electronic Campus <www.srec.sreb.org>.

Many of these virtual universities are addressing local and national needs today and are also partnering with other universities around the world for global needs in the future. These mergers and partnerships will resemble the mergers and acquisitions in other industries, such as the current consolidations in the publishing industry, the new broadcast and media mergers, and the unions between Web and commerce groups. The partnership between the UK's Open University and Florida State University is an early example of this type of intercontinental partnership.

Another major shift will be in the credibility of for-profit companies. Jones International University, <www.jonesinternational.edu>, received accreditation from the North Central Association of Colleges and Schools in March 1999 for its bachelor's and master's programs in business communications. The University of Phoenix, <www.uophx.edu>, is also well known for its wide range of accredited programs.

The higher education enterprise will expand its reach and in the process create a new category of higher education institutions that might be called career universities. These institutions will have expertise in teaching and reaching working professionals with complete packaged programs that accommodate different sets of life-style and work needs. The necessity of keeping costs low will be reduced, as many of the companies that send their students to these programs will subsidize the time and the cost of these programs. For professionals seeking to prepare for new careers, features such as access, flexible design, and relevant offerings will be the primary decision making factors. Whereas most major universities have branches that reach out to working professionals, these branches may well become the foundation of entirely new learning institutions.

One caveat here: The best institutions for working professionals will probably be focused institutions–those with existing expertise in professional education–that are supported by faculty research. We can see the beginnings of these types of relationships with programs such as the Executive and Global MBA programs offered at Harvard, Wharton, Penn State, Duke, and Purdue, among others.

Successful institutions may well expand into other high-priority, related programmatic areas. If very successful, these institutions may spin off entire portions of the university or college into nonprofit foundations or for-profit enterprises. Alternately, highly integrated partnerships with leading industrial companies may become larger entities within institutions. Successful institutions may stay tightly integrated if they can solve the organizational and faculty challenges of diverse businesses.

Degree and Continuing Education Programs: The Second Set of Predictions

- Higher education program offerings will shift from a focus on degree programs to an almost infinite variety of new types of certifications, modular degrees, and group programming.
- Many of the new programs will have significant components that are self-paced and self-tested, and can be done anywhere, anytime. Subscription alumni programs may proliferate.
- Interaction with expert faculty will be an integral feature of these programs. However, access to expert faculty will be expensive either in terms of time or money.

The focus of most of these degree and continuing education programs will not be geographic. These programs will be developed and delivered to provide access to as many learners as possible. We already are seeing tremendous growth in degree opportunities that are place and time independent. Earlier versions of these programs were evening and weekend programs. Now we will see an explosion of anywhere, anytime programs that meet a wide range of student needs. These programs may be complemented by highly concentrated residential experiences that can be completed with one or two weeks away from work.

These programs will reflect the design process that begins with a study of the life-styles and needs of the target students, and then the creation of programs that fit the students' needs. This is part of the new customization strategy of these programs. Many MBA programs are now available as intense, focused learning programs that use a supportive cohort of students to help address the common problem of dropping out among working professionals. Another strategy that institutions are developing is the modularization of their degree programs. One expanding pharmacy program allows students to start a nine semester program at the beginning of any semester. Other programs offer eight-week rather than fifteen-week semesters. Many of these programs have intensive conference-like orientation activities to help participants get to know each other, and then use frequent, asynchronous communications throughout the program to maintain a sense of community.

The focus of another category of professional programs already in place is on updating and upgrading knowledge in a specific field. This is most pronounced in the professional areas of engineering, business, medicine, law, nursing, pharmacy, and education. Program content in the future will continue the focus on updating knowledge and skills, including areas such as perspectives, contextual problem solving, and networking. New professional tools and programs will likely incorporate the updated knowledge and skills into professional tools. Distinctions between working and learning will blur significantly. This may have interesting implications for continued annual certifications.

Other institutions with strong ethical and values traditions may offer continued growth in nonspecific professional programs and offerings. Institutions will likely design new ways of creating loyalty to their particular degree and nondegree programs. Institutions may choose to offer subscriptions to an integrated set of learning opportunities, which will include choices of learning programs, combined with access to large databases of content, special alerts, and networking opportunities with fellow students.

Another trend that may impact these predictions is the growth in the desire and need for an undergraduate degree. Some states will be facing significant enrollment pressures over the next 10 to 15 years. In these states, demands for alternative ways to provide undergraduate degrees may well encourage the development of new, focused models. One strategy being tested in Florida is the use of partnerships between community colleges and four-year institutions. In some of these programs, a number of upper division courses will be offered on community college campuses. All these options and mixes will further blur distinctions between higher education institutions.

Institutional Infrastructure: The Third Set of Predictions

- The 1990s will be remembered as the decade of the Web. The next decade will be one of mobile, portable, wireless technology that supports teaching and learning anywhere, anytime.
- Tools and systems that support teaching and learning will become part of the critical infrastructure on higher education campuses.

The transition to the higher education institutional infrastructure of the future is well underway. Many institutions recruit, admit, and screen students from afar. Students can register, pay bills, check grades, update addresses and phone numbers, and receive course and programmatic consulting online. Content resources are being accessed electronically from students' homes and other locations. Content resources are digital, dynamic, and distributed.

The development of online campus services will continue to evolve rapidly. Standing in line on campus is being replaced by being online off campus. Faculty student consulting and office hours are being replaced by asynchronous e-mail and synchronous chat, telephone calls, and videoconferences.

Future developments in information technology infrastructure will focus on enhanced security and reliable communication and collaboration tools. Information technology tools will also center on teaching and learning online. Evolving Web Course management tools and collaboration tools will be rapidly enhanced, with the potential for reducing the amount of time and skill needed to teach and manage learning online.

These tools will have templates for different types of courses, collaboration tools to assist faculty and students with different types of online dialogues, testing and assessment applications for testing and tracking, and students' tracking of their own status. It is important to watch Internet2 developments, specifically what is being created in high-end collaboration tools for research and teaching. These sophisticated collaboration tools will have significant resource requirements initially, but these will decrease over time.

Barriers to effective, comfortable virtual learning are coming down, but they are still significant. Access to computing and to the Web will not be virtually universal for another 5 to 15 years. The cost of hardware is now rapidly declining after a period of stability around the $1,000 to $1,200 point. Competition is heating up at the $600 to $700 level, and may be lower by the time you are reading this. Free options are also available, but with commitments for two to three years, the cost still is close to $500 to $600.

The camera attached to the computer for one-on-one videoconferencing is becoming a standard accessory, and I am more ready for it now than I have been in the past. Videoconferencing is the kind of tool that one only wants to use if partners in communication also have access to it. This factor is slowing down greater use of this tool; however, there are also drawbacks to real-time video communication. Students in one distance learning program complained that, when their one-way video system moved to two-way video, eating a pizza and putting their feet up were no longer good form!

If technology power keeps increasing at the rate of a generation of technology every 18 months, technology access will probably not be a problem. However, I believe that the cost of access to information will be an increasingly formidable challenge. Just as we have seen a shift from hardware costs to software costs, we will see a shift from the relatively low cost of Internet access to the higher costs of accessing well-structured, easily researched content. The digital library of today is not really free; the digital library of the future will probably not be free. Just as we can subscribe to many sources of content today, including magazines, cable channels, and newspapers, we will be able to subscribe to many varied databases of content that are comparable to premium cable channels.

Over the next few years, we will see multiple generations of software agents come and go. Maybe by the year 2007 we will have become accustomed to personal robots, digital assistants who can help us remember our preferences and who we interact with most frequently. These robots will write our summaries and to do lists; anticipate the articles we want to read; help formulate the questions we might have; and provide guides, hints, and insights into the answers. The new mapping systems, available in some automobiles, that serve as personal navigators are one specific instance of personal assistants.

What about Peter Drucker's comment in 1996 that colleges campuses will no longer be needed? I believe that college campuses will still be needed to serve the core mission of educating 18 to 24 year-olds. I also believe that many portions of campuses will be redesigned to better serve 25 to 74 year-old learning professionals. Any institution undergoing construction should consider this population and its needs, and the new type of programming in the future. Miniconference centers, as opposed to classroom buildings, may be the way to go.

If the primary classroom of the future is to be on the Web, designing and supporting the new teaching and learning environment will require some serious thinking and investment. The campus infrastructure must have new virtual plant or IT organizations to design, plan, implement, and support teaching, learning, and research.

Faculty and Student Tools and Roles: The Fourth Set of Predictions

- Faculty work and roles will become dramatically specialized.
- A major barrier to the development and delivery of the new learning professional programs will be faculty and instructional designers to develop and deliver these programs.
- Tools to support faculty and student work online will evolve quickly.

Higher education teaching and learning today is in many respects a cottage industry. We have one person, the faculty member, doing a whole course–from soup to nuts. From the design and development phases through the delivery of the course, the one faculty member does it all. And this same process of creating and building the course is repeated every semester, because every time we teach a course, we revise it, at least slightly. This is the model of the master craftsman.

In the next ten years, I hope that we will begin to address the challenge of customization and personalization with technology and less intensive faculty resource investment. This may be the least reliable of all the predictions.

Faculty work is already undergoing dramatic shifts. Faculty are now expected to learn the software tools that support teaching and learning on the Web, often without any additional time. Yesterday's word processing is today's course management tool, and we can be confident that tomorrow will bring a new set of tools. In addition to learning how to teach in this new environment, faculty often must assist students in learning how to learn in a new way as well. The new active collaborative modes of student learning are more demanding on the student; inevitably, time spent on the technology will divert some energies away from content learning.

Teaching is becoming a technology-intensive part of the faculty member's responsibilities. The demands on the faculty will continue to increase unless specialization is acknowledged and supported. Not every faculty member can or should do everything. Some will focus on program design and development, others will focus on course delivery or overseeing tutors who manage the actual interaction with students.

Some faculty who delight in the combination of development and delivery may well become teaching and learning personalities, specializing in the creation of resources to be used by many others or the broadcast delivery of those resources. These faculty personalities may stay at colleges and universities, or they may become stars of the for-profit content publishers or for-profit institutions. Again, some faculty may keep doing what they are now doing for some time to come, but the new cadre of faculty will be expected to know how to teach online.

The shift to faculty specialization and online teaching is hindered by three major factors: time, resources, and habits.

Time is precious, and change requires time. It also requires energy. Yet changing and rethinking our courses and programs on campus will require resources and skills that are not always available. Faculty need to ask fundamental instructional design questions about their courses. The good news is that many of the new faculty tools have some instructional design already built in. This will help the process. The change process will also go more smoothly if faculty have support in thinking through the questions about how to use these new tools in an online environment.

The question of habits is something we don't talk about often. Faculty and students have habitual ways of doing their work. Moving to these new tools is not automatic. These changes of habits will shift more smoothly and with much less stress if faculty are given time and tools to develop new habits.

While the majority of learning has always occurred outside the classroom, we will now see faculty doing much more teaching outside the campus classroom as well. This means not only online, but also off-campus. Learning is moving to the home, to the workplace, to wherever the learner is.

Computers will not go away, even though sometimes we may wish they would. Time spent learning good new habits with our computers will be time well spent. In our new world of the future, a computer linked to a network will probably be more important than a car.

Content Resources: The Fifth Set of Predictions

- More of the core concepts and basic principles of fields of study will be prepackaged.
- More learning will be structured for knowledge and skill competencies, especially in the learning professional institutions.
- Access to well-structured content and databases will not necessarily be free. There will be free areas and subscription areas.
- Rather than course databases, discipline databases will be suitable for knowledge clusters.

Publishers are moving quickly to build large databases of content on the Web that are suitable for supplementing textbooks. These databases of content could become a large percentage of a course. Rather than redevelop 40 to 60 percent of a course every semester, a faculty member might only need to plan or redesign 30 percent of the course.

These databases of content might also become attractive portals for discipline knowledge. As we have discussed, the trend toward greater use of synchronous and asynchronous forums is just getting underway. Each of the places will become a Web channel for learning the basic competencies in these fields. In some cases publishers may spin off lifelong learning businesses using their rich sources of content. Faculty now work for publishers as writers and editors; maybe they will become discipline tutors. One company, CBT Systems, offers self-paced, high end, professional updating and certification tutorials, as well as courses that come packaged with a mentor.

Another prediction is that more learning will be structured for knowledge and skill competencies. In the information age, the need to acquire competencies will be more important than obtaining degrees and good grades beyond basic higher education. Therefore, learning, especially in professional programs, will be structured for general awareness and understanding in some areas and depth of knowledge and analysis in other areas. It will always be integrated with work applications.

We may wonder how the basic knowledge from core discipline areas fits into this concept. Who needs to know these basics? Is the goal of learning those basics to develop a wiser way of thinking about the world overall? Can that goal be achieved by studying other basics? What are the core concepts, principles, and perspectives our students will need for the next three to four decades?

Along with questions regarding curriculum changes in the new environment come concerns about cost. Although computer hardware costs are coming down dramatically, the cost of access to well-structured content databases is increasing. Many Web sites that used to be free are becoming subscription sites. We are learning that just as books and newspapers are not free, the Web will not be free. We do have free broadcast television, and this model will probably be extended to the new Web content media. There will be free areas supported by advertisers and subscription areas financed by users.

Over the next decade, higher education will rethink the basic components and structure of its enterprise, including courses and degrees. It is possible that the course as the basic unit of structure for higher education will disappear, and it may be possible that we will have many more choices.

Research in Learning: The Sixth Set of Predictions

- More research on learning, and, more specifically, research on the structuring of content for rapid acquisition of core concepts and principles of knowledge, will be funded. Who will take the leadership in securing this funding? Who will fund this research and who will conduct this research?
- Technology, including tools, resources, and communication methods, will be used to stimulate and enhance learning to meet the needs of working professionals.

The question about the role of computer technology in teaching and learning has been seriously asked for about 20 years. Two decades ago, we first talked about the possibility of technology replacing the teacher. William Norris, CEO of Control Data in the 1980s, said that, "if a teacher can be replaced by a machine, he or she ought to be." That was a revolutionary statement at the time, but he meant exactly what he said. And with the benefit of 20 years of development of technology and tools, we should think deeply about what portions of the learning process can efficiently be done without the intervention or interaction of a teacher. Perhaps those portions of learning ought to be done a different way. We now talk comfortably about teachers being mentors, coaches, and guides rather than sages. We are now comfortable that the role of the teacher is to assist learners when they need help.

The question of how we can effectively use technology to help society meet its learning needs over the next decades is a very serious question indeed. We have not been doing nearly enough research in this area. We are using information age technology to support industrial age learning experiences. We are rich in choices of tools today, but the wisdom in how, when, and where to use these tools is lagging seriously behind. Also lagging are serious efforts at building computer tutors with the aid of artificial intelligence to monitor and guide the learning process.

We all can and must learn much faster than we do. But we need to know more about how to structure content and interaction with the content to become faster learners. More research on learning will show us how to improve the design of content materials and how to build resource materials that will last longer than one semester. Some of this is happening with publishers building simulations and concept demonstrations. But much of this is being done without the benefit of research into how these tools can be built more effectively and efficiently.

Consider how the articles in *Scientific American* are written. Generally, any one can read the first few paragraphs of a *Scientific American* article, but with each paragraph, the text and the concepts become more difficult, and a greater knowledge base of the discipline field is needed for full comprehension. When this happens to me, I go back and reread. Sometimes this is enough to help me continue to broaden my own knowledge. Other times, quite frequently, I give up and move to other content. But that's okay as it is leisure reading for me. In learning situations, however, we need to persevere until we build that larger conceptual framework and fill in some of the content.

We know that learning needs to be rooted. Consider the view of the tree of knowledge, which is still a good analoguey. The core concepts, the essential understanding of a field of knowledge, are the roots, the large lower tree trunks, and the large branches. Without that root system, many other concepts we might delight in–the smaller branches, leaves, and fruit–are not accessible. We need to have materials that can help students build knowledge structures well and effectively.

Moving On

We are only eight short years from 2007. Where will we be at that time? Going back to the quote by Gibson, "The future is here. It is just not evenly distributed." Many of my predictions are extrapolations of current trends. We know that we will be surprised by the future. The Web surprised us all. What other surprises are out there?

As we come to a close of our journey to the Web, here is an imaginary journey into a future where some of our visions for individualized instruction may actually come true.

Student-Centered Learning in the Lasting Experiences Ltd. Holodeck: As Good as It Gets!

A Minidream and Fantasy Voyage in Search of Lifelong Learning

Here I am at last . . . on an educational holodeck, modeled after the famous Holodeck of the Starship Enterprise. I have been thinking and dreaming about this ever since I watched Star Trek reruns with my children in the late 1980s. And I am very fortunate to have as my holographic tour guide my favorite educator and philosopher, Dr. John Dewey.

John Dewey (let's call him Dr. Dewey from now on) is very animated as he leads me through a series of demonstrations in the newly dedicated educational holodeck called "Lasting Experiences Ltd." Dr. Dewey begins by taking a deep breath and saying that now, at last, we have a set of educational tools worthy of addressing his dreams of creating really effective and individualized student-centered learning experiences.

The Learning Continuum

Dr. Dewey says that one of the key concepts he wrote about early in the 20th century was the importance of *continuity* in learning, providing a continuum of learning experiences so that a student could build knowledge, brick by brick, layer by layer, synapse by synapse. Even back then, he continued, we knew that for effective learning, students needed an "orderly and ordered set of activities that could result in the completion of a learning process." Learning experiences, almost throughout the 20th century, were more a series of random events that may or may not fit the internal continuity of structure needed by students. We hoped that students would learn, and students did learn, but it was not very orderly, and many students missed a great deal. Most important, many students missed the orderly development of a rich and broad foundation of knowledge that would support them in becoming effective lifelong self-learners. The challenge back then was that dealing with even small groups of students made it difficult to provide the continuum of learning that could efficiently meet the needs of individual students.

Now, he says, look at what happens here in the Lasting Experiences Holodeck! Dewey stops before what looks like an old airport security check point system. As students step through this arch, they pause and are recognized by the system. Then they hear their mentor's voice welcoming them and accompanying them to the section of the holodeck that is being individually and dynamically readied for them. Dr. Dewey explains that this is a security and identification point. As the students pause, the system recognizes them by their eyes, searches for their appropriate mentor, and recreates that mentor in holographic form. The student in front of us goes off with a holographic mentor of Gordon Moore, the famous CEO of Intel in the late 20th century.

Anticipating that I might object to such isolated and generated learning experiences, Dr. Dewey quickly explains more. He says that students must have a variety of learning experiences. The Lasting Experiences Holodeck is used for their conceptual development and problem-solving experiences. The holodeck knows what aims or goals students have and creates, via artificial intelligence (AI), the types of experiences needed by the student to build the next layer of knowledge and relationships. The AI scenarios are integrated learning experiences, often combining two, three, or more disciplines–leveraging the interdisciplinary nature of most problem solving and creativity.

At this point, Dr. Dewey digresses. He says that it is important to know one other concept that really informs the AI scenarios here in the Lasting Experiences Holodeck.

At the Intersection: The Zone of Proximal Development

In the mid-20th century, he said, an educational theorist by the name of Lev Vygotsky developed the learning concept of the Zone of Proximal Development. Vygotsky's concept of the Zone of Proximal Development (ZPD) was that the act of learning occurred at the intersection of four components: the Learner, the Teacher, the Content, and a Problem that could be solved using the Content. The ZPD represented the difference (or the gap) between what a learner could do individually and what could be done by the learner with the help of a more experienced person, usually a teacher or another expert. This zone might be thought of as the next layer of bricks, or the next sprout of new growth in the brain, or the development of a whole new area of knowledge. This concept also clarified the importance of the role of a teacher, in that the teacher was essential for more rapid and effective learning to take place than a learner could manage on his or her own.

This concept helped teachers understand the importance of Dewey's own principle, the "continuity of learning experiences." The ZPD also reinforces the concept of learning readiness with which it is closely associated. The readiness principle says that a learner needs to be at a point of readiness before learning certain material. Put another way, a learner cannot learn isolated facts easily, or integrate them usefully for the long-term and use them in any meaningful way. A learner can learn "facts" only if the knowledge can be related to knowledge or an experience the student already has. Vygotsky's principle of the Zone of Proximal Development suggests, that, in fact, the zone of learning possibilities for an individual learner might be a fairly narrow zone. On the other hand, it also suggests that the more we know, the more that we can come to know.

Dewey said that, for example, as they were experimenting with earlier versions of the mentoring and AI software, learners became frustrated either when the situation was too obvious or simple, or when the situation was too complex and the requirements too demanding. In the first case, learners would lose interest and search for more complexity, sometimes getting significantly off track, and sometimes misbehaving and causing trouble. In the second case, that of too much complexity, learners would make very basic mistakes due to a lack of understanding of core concepts and principles.

So the appropriate band or zone for learning needs to be carefully assessed. Over time, artificial intelligence software has been improved and can better assess just what zone of learning is possible for students, allowing students to optimize time on task.

Out of the CAVE: Interaction

At this point, I was becoming anxious to move on. (Maybe we were getting out of my zone!) I saw learners going with their holographic mentors into special rooms called CAVEs. The students in these rooms were interacting with their mentors in what appeared to be live action scenarios. Dr. Dewey, sensing my impatience, said, "Oh yes, let's take a closer look at these CAVEs." This is where most students' interaction with their mentors and the content and problems actually occurs. The second core design principle underlying efficient learning is that of interaction. These CAVEs actualize that principle.

CAVEs were first developed in the late 20th century. They were early precursors of this more advanced holodeck. (I still remember some of my early experiences in similar environments: riding a pterodactyl over some ancient castles in Germany, and tending a 3D garden with some 3D friends.) The acronym CAVE was derived from Computer Automatic Virtual Environment. The first CAVEs were room-sized advanced visualization tools that created the illusion of complete "immersion" in a virtual environment using high-resolution, stereoscopic projection and 3D computer graphics. Inside these CAVEs, a user could experience the effect of being in a totally generated environment.

We have kept the name CAVE to indicate a specific category of holodecks for educational purposes. There is one CAVE, for example, designed for the learning of core concepts at the intersection of physics, math, and chemistry. As you can see, we have tried to move beyond the concept of a single discipline of study requiring students to solve real-life complex problems. As most problems have many possible effective solutions, students can play with scenarios of various solutions. Over here is another CAVE focusing on the humanities, with interviews with famous artists such as Monet and Degas. Students here also experience the process of recreating paintings similar to that artistic style, using all the new digital tools. We have another popular CAVE at the intersection of artificial intelligence, education, computer science, and media.

We need people in the 21st century to bring the perspective of multiple disciplines and create more CAVE experiences. You are aware, of course, that some of the most rapid innovation occurs at the interaction of the study of disparate disciplines. We hope to encourage that type of innovation by these interdisciplinary CAVE experiences.

Dewey continued, "I don't want you to miss one of the most exciting CAVEs for our study of the learning process. The software in this CAVE has the knowledge and experience of over 400 educational theorists, cognitive psychologists, and neurologists. This CAVE is being used to advance the design of the next generation of CAVEs for even more complex simulations. We still do not know nearly enough about just how to design and create learning scenarios for optimal efficient learning of concepts, and for the learning of problem-solving skills."

Some of the questions being researched include those suggested by Henry Kelly, from the Office of Science and Technology of the U.S. government, in April of 1998 at a Net98 Conference. Dr. Kelly suggested that it was time, indeed past time, to elevate the importance of research on education and learning. Dr. Kelly argued passionately that our society needs to be able to respond more flexibly to the explosion of learning demands that have been brought on by the information age. He encouraged people at that conference to join together to more effectively formulate, articulate, and find funding for advanced and innovative research on learning processes, as well as on learning software and hardware and networking technology. "We are now benefiting from some of the studies funded back in the late 1990s!" Dr. Dewey assured me.

Let's go back to the concepts that Dr. Dewey felt were very important, and which we can now effectively do. One of his most impassioned messages was that the aim of education is the development of reflective, creative, responsible thought. To achieve this aim requires educational experiences that combine the two characteristics of continuity of learning and interaction with others into the learning experience. The *interaction* characteristic highlights the importance of the dialogue and communication underlying learning; the *continuity* characteristic emphasizes that the individual learner must be viewed as the key design element. In other words, we must design instruction so that each individual learner can effectively build on what he or she knows and has the resources and assistance to learn, or, in Vygotsky's words, "to navigate the Zone of Proximal Development."

Don't Lose Touch with the Mother Ship: The Role of the Teacher

The Educational Holodeck from Star Trek provides a more active and customized environment for student-focused learning than anything we have available to us. The environment accommodates itself to the readiness of the student, meets the student where he or she is, and takes the student to the next step of learning in an integrated experience guided by an individual mentor.

You might well ask, where is the teacher in this environment? Is it possible that the role and function of the teacher is to create the environment, to create the personality of the mentor, and to create the joining of time, place, the goal of the student, and the learning to be done?

During the course of the tour, I did notice that many of the students were in fact quite young. When I remarked on this to Dr. Dewey, he said that yes, they were young. As the 21st century was beginning, he commented, it was obvious that our young people were staying in school until they were in their mid-20s, and even into their 30s for advanced degrees. As the concept of lifelong learning became accepted, we reinstituted the practices of apprenticeships and sabbaticals, encouraging students to begin work as young as 15 in their chosen fields, and then taking sabbaticals of four to six months to upgrade their skills and advance to the next levels of their professions or to change or adapt their chosen professions.

Beam Me Up, Scotty

As we were finishing the tour of the holodeck, I asked Dr. Dewey about the costs involved in its development and operation, reminding him that one of the important goals in the late 20th century was for effective, efficient, and cost-effective education. Dr. Dewey shook his head a little sadly at that question. He shared that the costs for effective and efficient education were still increasing. He said that he hoped, however, with the next two to three cycles of hardware and software–over the next five years–we would at long last see some cost efficiencies. In the meantime, we have made learning more efficient and effective, even if not less costly. And we have addressed the priceless need for student-centered learning.

For a look at the current state of affairs of CAVEs, check out <www.ncsa.uiuc.edu/VR/cavernus>.

Conclusion

We have a busy time ahead and an exciting time. The pace of learning and teaching and the need to know have never been greater. We as faculty and administrators, as educators, have a chance to shape the future–again!

RESOURCES

Barker, J. A. (1993). *Paradigms: The business of discovering the future* (reprint ed.) New York: Harper.

Boaz, M., Elliott, B., Foshee, D., Hardy, D., Jarmon, C., & Olcott, D., Jr. (1999). *Teaching at a distance: A handbook for instructors.* Mission Viejo, CA: League for Innovation & Archipelago.

Boettcher, J. V. (1995, October). Technology classrooms, teaching, and tigers. *Syllabus*, 9, 10-12.

Boettcher, J. V., & Cartwright, P. (1997, September/October). Designing and supporting courses on the Web. *Change*, 10, 62-63.

Bransford, J.D.B., Brown, A.L., & Cocking, R.R. (Eds.). (1999). *How people learn: Brain, mind, experience, and school.* Washington, DC: National Academy Press.

Brochet, M. G. (1989). Effective moderation of computer conferences: Notes and suggestions. In M.G. Brochet (Ed.), *Moderating conferences.* Guelph, Ontario: University of Guelph.

Bruner, J.S. (1963). *The process of education.* New York: Vintage Books.

Collis, B. (1996). *Tele-learning in a digital world: The future of distance learning.* London: International Thomson Computer Press.

Cohen, E. (1972). *Designing groupwork.* New York: Teachers College Press.

Cooney, D. H. (1998). Sharing aspects within aspects: Real-time collaboration in the high school English classroom. In C. J. Bonk & K. S. King (Eds.), *Electronic collaborators: Learner-centered technologies for literacy, apprenticeship, and discourse.* Mahwah, NJ: Lawrence Erlbaum Associates.

Dewey, J. (1916). *Democracy and education.* New York: The Macmillan Co.

Dewey, J. (1998). *How we think.* Boston: Houghton-Mifflin. (Original work published in 1933)

Dolence, M. G., & Norris, D. M. (1995). *Transforming higher education: A vision for learning in the 21st century.* Ann Arbor, MI: Society for College and University Planning.

Eastmond, D. V. (1995). *Alone but together.* Cresskill, NJ: Hampton Press.

Gates, B. (1995). *The road ahead.* New York: Viking Penquin Books.

Goss, T. (1996). *The last word on power.* New York: Doubleday.

Green, K. C. (1999). *Campus computing 1998.* Encino, CA: The Campus Computing Project.

Hafner, K., & Lyon, M. (1998). *Where wizards stay up late: The origins of the Internet.* New York: Touchstone.

Harasim, L. H., Starr R., Teles, L., & Turoff, M. (1997). *Learning networks: A field guide to teaching and learning online.* Cambridge, MA: MIT Press.

Hiltz, S. (1994). *The virtual classroom: Learning without limits via computer networks.* Norwood, NJ: Ablex Publishing.

Johnson, D. W., & Johnson, R. T. (1993). Cooperative learning and feedback in technology-based instruction. In Dempsey & Sales (Eds.), *Interactive instruction and feedback.* Englewood Cliffs, NJ: Educational Technology Publications.

Knowles, M. (1998). *The adult learner: A neglected species* (4th ed.). Houston: Gulf Publishing.

Knowles, M. (1980). *The modern practice of adult education: From pedagogy to andragogy* (2nd ed.). Wilton, CT: Association Press.

Larocque, D. (1997). Me, myself and . . . you? Collaborative learning: Why bother? <http:leahi.kcc.hawaii.edu/org/tcc-conf/pres/larocque.html>.

Lucky, R. (1998 July/August). A lucky hit. *Technology Review, 101,* 72-75.

Maisie, E. (1998). Keynote speech. 14th Annual Conference on Distance Teaching and Learning. Madison, WI.

McCormack, C., & Jones, D. (1998). *Building a Web-based education system.* New York: Wiley Computer Publishing.

McGown, R., Driscoll, M., & Roop, P. (1996). *Educational psychology: A learning-centered approach to classroom practice.* Boston: Allyn & Bacon.

McKinnon, J. (1998, September 6). Online courses demand more of profs. *Tallahassee Democrat.*

McLuhan, M. (1967). *The medium is the massage.* London: Penguin Books Press.
<http://www.vyne.com/mcluhan/>

Moore, M.G., & Kearsley, G. (1996). *Distance education: A systems view.* New York: Wadsworth Publishing.

Pea, R. D. (1994). Seeing what we build together: Distributed multimedia learning environments for transformative communications. *The Journal of the Learning Sciences,* 3(3), 285-299.

Pelikan, J. (1992). *The idea of the university: A reexamination.* New Haven, CT: Yale University.

Rheingold, H. (1993). *The virtual community.* Reading, MA: Addison Wesley.

Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). New York: Free Press.

Rudduck, J. (1978). *Learning through small group discussion.* Guildford, Surrey: Society for Research into Higher Education.

Rumble, G. (1997). *The costs and economics of open and distance learning.* Stirling, VA: Kogan Page.

Sherron, G. T., & Boettcher, J. V. (1997). *Distance learning: The shift to interaction* (Vol. 17). Boulder, CO: CAUSE.

Skinner, B. F. (1958). *Teaching machines*. Science, 128, 91-102.

Tiffin, J., & Rajasingham, L. (1995). *In search of the virtual class*. New York: Routledge.

Vygotsky, L. S. (1962). *Thought and language*. Cambridge, MA: MIT Press.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Wagner, E. D. (1997). Interaction: From agents to outcomes. In T. E. Cyrs (Ed.), *Teaching and learning at a distance: What it takes to effectively design, deliver, and evaluate programs*. San Francisco: Jossey-Bass.

Young, J. R. (1997, August 1). UCLA's requirement of a Web page for every class spurs debate. *Chronicle of Higher Education*, p. A21.

Judith V. Boettcher

Judith V. Boettcher is the executive director of the Corporation for Research and Educational Networking (CREN), a non profit higher education member organization. CREN's mission is to provide knowledge services and Internet tools to support information technology professionals in research and education. Prior to joining CREN, Boettcher was the director of the Office of Interactive Distance Learning at Florida State University. She also served as the Director of Education Technology Services at Penn State University in State College, Pennsylvania. While at Penn State, she chaired the universitywide Technology Classroom program that designed and developed over 50 technology classrooms. While at Control Data Corporation, she served on League for Innovation task forces on strategic planning for technology integration into the teaching and learning process and on library automation.

Boettcher has a Ph.D. in education and cognitive psychology from the University of Minnesota and a master's degree in English from Marquette University in Milwaukee, WI. She served as the project leader for the Educational Uses of Information Technology (EUIT) Joe Wyatt Challenge EDUCOM project, 1990-1992.

She is dedicated to the transformation of teaching and learning processes with the wise use of information technologies. This commitment is based on the belief that the higher education community, empowered by the new knowledge technologies, can create a renaissance of teaching and learning for students and faculty and for the larger needs of society. Her e-mail address is <jboettch@cren.net>.

Rita-Marie Conrad

Rita-Marie Conrad is an online instructor for the master's degree program in instructional systems design with a major in open and distance learning at Florida State University. In this role, she is responsible for managing the delivery of Web-based courses on topics such as online collaboration, learning theories, and the design of Web-based instruction. She has also taught computer literacy and multimedia programming courses at Tallahassee Community College, and other educational technology courses at Florida State University. She has consulted on the design and implementation of distance learning courses, managed technology-related projects, and provided educational technology consulting and training to K-12 teachers.

Conrad has presented on a variety of online and distance learning topics at conferences such as the International Council for Distance Education (ICDE), the Association for Educational Communication and Technology (AECT), and Syllabus, and at the University of Wisconsin. She has a Ph.D. in instructional systems design with a specialization in distance learning from Florida State University. Her e-mail address is <rconrad@mailer.fsu.edu>.

CORPORATION FOR RESEARCH AND EDUCATIONAL NETWORKING (CREN)

The Corporation for Research and Educational Networking (CREN), is a nonprofit organization that provides knowledge services and Internet tools to support the needs of higher education and research institutions. CREN focuses on providing strategic and practical IT services, such as live expert audio Webcasts, high volume mailing list management software, and certificate authority services. Complementary services are offered to members through vendor alliances. CREN produces and disseminates knowledge and services on academic and professional IT issues to over 200 institutional members, including Princeton, Penn State, Oberlin College, and Portland Community College.

Created in 1989 from the earlier 1983-launched BITNET organization, CREN now focuses on support of campus information technology infrastructure professionals. One of the most effective and widely used forums that members engage in is CREN's "TechTalk with the Experts" Webcast Series. Since their debut in late 1997, these live audio Webcasts have been hosted by top campus leaders in the information technology field who share their knowledge and expertise with faculty, staff and students at CREN member institutions. Engaging in active question-and-answer sessions about a variety of IT topics relevant to their institutions, both academics and professionals are able to learn more about topics such as "The Digital Millennium Copyright Act" and "Tools for Teaching and Learning Online." Web event pages provide background information and resource links about the TechTalk topics, and audio archives and transcripts are available following each event. Schedules for TechTalk Webcasts are regularly posted on CREN's Web site, <www.cren.net>.

To address the increasing need for institutions to engage effectively in secure interinstitutional resource sharing, CREN is currently implementing a top-level Certificate Authority Service which provides authentication services to CREN's member institutions and other organizations within the academic and research community. This service is designed to ensure that online information access and e-commerce is secure and affordable for members of the campus community.

As a way of providing even more member benefits, CREN has formed alliances with a number of organizations with similar missions, including CBT Systems and Blackboard Inc. CREN also creates and produces ListProc 8.2, an expanded version of the popular electronic mailing list management software. ListProc 8.2 has the capacity to handle the large and growing email lists regularly found at higher education institutions.

As a result of its expanding informative archive of IT resources, CREN's Web site was named "Site of the Month" in April 1998 by The Technology Source, <http://horizon.unc.edu/TS/>. You are encouraged to learn more about CREN's mission and services by visiting the organization's Web site at <www.cren.net> or by contacting the CREN office at (202) 331-5366.

Since 1968, the League for Innovation in the Community College has been making a difference in community college education and in the lives of millions of educators and students. The League's ongoing mission is to improve community colleges through innovation, experimentation, and institutional transformation. Twenty CEOs from the most influential, resourceful, and dynamic community colleges and districts in the world comprise the League's board of directors and provide strategic direction for its ongoing activities. These community colleges and their leaders are joined by more than 670 institutions that hold membership in the League's Alliance for Community College Innovation (ACCI). The League–with this core of powerful and innovative community colleges and more than 100 corporate partners–serves nationally and internationally as a catalyst, project incubator, and experimental laboratory for community colleges around the world. Current initiatives take shape in the publications, conferences, institutes, and other quality services associated with the League's internationally recognized Workforce, Leadership, Information Technology, and Learning-Centered Education programs. These current programs, along with the League's 31-year history of service to the community college world, explain why *Change* magazine called the League the "most dynamic organization in the community college world."

LEAGUE FOR
INNOVATION
IN THE COMMUNITY COLLEGE

LEAGUE FOR
INNOVATION
IN THE COMMUNITY COLLEGE

www.league.org

26522 La Alameda, Suite 370
Mission Viejo, CA 92691
Tel (949) 367-2884
Fax (949) 367-2885